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Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

A CALIFORNIA INTERINDUSTRY ANALYSIS EMPHASIZING AGRICULTURE

Part I: The Input-Output Models and Results

William E. Martin and Harold O. Carter

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ERRATA

Table I-I, column 27, reads Soap & By-products; should read, Scrap & By-products.

FOREWORD AND ACKNOWLEDGMENTS

This is Part I of the first report in a series of studies focusing on the structure of the California economy. The research approach is the familiar "Leontief" input-output analysis--also referred to as interindustry analysis; particular emphasis is given to quantifying the interrelationship between agriculture and industry. Part I of this report is concerned primarily with formulating the California input-output models and discussing the implications of the empirical results. Part II, of primary interest to the research worker, relates the tedious and unglamourous aspects of input-output work--the estimating techniques and procedures used in constructing the California interindustry models.

Subsequent studies in this series will give attention to optimization and projections of growth in the California economy.

A number of people were consulted who provided advice, assistance, and supplementary data for the study. Dr. Irving Hoch and Dr. Ivan Lee, Department of Agricultural Economics, University of California, Berkeley, made many valuable suggestions in reviewing a preliminary draft of the report. Dr. Pinhas Zusman, Faculty of Agriculture, Hebrew University, provided unpublished data on labor coefficients for individual sectors. Personnel in various governmental agencies (state and federal) were helpful in supplying both published and unpublished data necessary for the analysis. Much of the statistical calculations were done in the Agricultural Economics Statistical Pool under the supervision of Mrs. Marilyn Vaage. Mrs. Merola Sorg supervised the typing of the manuscript.

A CALIFORNIA INTERINDUSTRY ANALYSIS EMPHASIZING AGRICULTURE[1/]
PART I: THE INPUT-OUTPUT MODELS AND RESULTS

by

William E. Martin[2/] and Harold O. Carter[3/]

I. INTRODUCTION

California is in a state of rapid economic development. Efforts to understand and guide this development are being made by leaders in government, business, and agriculture. California's complex economic structure, however, makes difficult the formulation of rational programs of action and/or the estimation of the effects of alternative courses of action.

For example, highway construction is an ever-increasing expenditure in California. The direct effect of this expenditure on the construction machinery industry is relatively simple to ascertain, but indirect effects--not so easily quantified--occur as well. How does this increase affect the petroleum industry, the primary metals industry, the chemicals industry, and even the agriculture industry? While in some cases these effects are insignificant and may be disregarded for planning purposes, often these effects are surprisingly large.

Defense spending is another important source of change in the California economy. The exact effects of an increase or decrease in defense spending on employment and output of other California industries are often a point of controversy, however. Of especial interest in California, where the aircraft industry is concentrated in the South, are the effects of increased or decreased spending on the economies of northern areas.

Additional examples of problems faced by California's economic leaders are as follows: (1) Increasing labor and water costs may cause certain segments of agriculture to lose their comparative advantage over other regions. What are the direct and indirect losses to the California economy due to these production shifts? (2) Increases and decreases in acreage allotments for crops

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1/ This study is reported in two parts. See: Martin, William E., and Harold O. Carter, A California Interindustry Analysis Emphasizing Agriculture, Part II: Statistical Supplement, Giannini Foundation Research Report No.

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such as cotton and sugar beets have widespread effects on other industries--these effects should be quantified for planning purposes. (3) If particular industries are to be encouraged for growth in California, which industries best stimulate output, employment, and income in other industries of the economy?

Difficulties in analyzing these and other problems arise because the many and varied agricultural, manufacturing, and service industries comprising California's economic structure are each dependent on the functioning of the other--either directly, or indirectly through a chain of direct dependence. Although an individual industry might be small in relation to the total economy, the reverberations of an action by or on that industry may be felt throughout the economy. The indirect effects of this action might easily be larger than the immediately apparent direct effects. The economist interested in attacking these difficulties has many alternative research procedures to choose from. Yet, most procedures do not specifically consider the entire economy as an interrelated unit--and some allow only qualitative estimates of these relationships. This study discusses and uses one research approach--interindustry analysis--that allows quantitative estimates of the interrelationships of a complete economy and, when applied to the California economy, provides a framework for measuring the impact of alternative public and private investment decisions.

The specific analytical tool involved is the "Leontief" system of input-output accounts. The values of goods and services of every industry are classified and arranged so that the sectors from which they are an output and to which they are an input are immediately apparent. Then, using rather simple mathematical transformations, coefficients are derived that give quantitative insights into the operations of the economy and enable us to investigate and analyze the effects of one industry on another.

Objectives of the Study

The general objective of this study is to quantify and analyze the structure of the California economy so as to identify interactions among economic sectors within California as a whole, between the northern and southern regions of California, and between California and the world. Emphasis focuses on the interdependence of agricultural and closely related industrial sectors. This study,

reported in two parts, is static in character, deriving its results from the analysis of one year's operation of the economy.[1/] It is viewed as the initial step in a long-range program of analyzing the structure of the California economy, however, and forms the basis of later studies in which optimization and projections of economic activities over time are considered.

The models used are largely composite adaptations of previous theoretical formulations, although certain innovations in concepts are presented. This is the first time to our knowledge, however, that a complete intrastate system of more than one region has been defined empirically.

Specific objectives of this study are to:

1. Formulate a structural model of input-output relationships describing the California economy.

2. Adapt the basic structural input-output model so as to present interrelationships between California regions as well as industries.

3. Use presently available statistics to empirically implement the California input-output models for the year 1954.

4. Interpret, in the light of suggested uses of this model for analyzing the California economy, coefficients (1) summarizing the cost structure of economic sectors, (2) expressing the interrelationships between each sector and final demand, and (3) describing the interrelationships between each sector and output changes of other sectors.

5. Quantify the relationships between final demand for California products and requirements for certain primary resources such as labor, wages, and imported goods and services.

II. INPUT-OUTPUT FRAMEWORK

Historical Background

Although theoretical systems describing a complete economy have been discussed since the time of Quesnay,[2/] and an elaborate general equilibrium system was developed by Walras,[3/] input-output analysis as used today was first

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1/ For Part II see: Martin and Carter, op. cit.

2/ Quesnay's tableau economique had productive industry (agriculture), service industries, and final demand presented in a form strongly suggestive of present day input-output models. Phillips, A., "The Tableau Economique as a Simple Leontief Model," Quarterly Journal of Economics, Vol. 69, February 1955; Quesnay, Francois, Tableau Economique, first printed in 1758, reproduced in facsimile for the British Economic Association, London, England, 1894.

3/ Walras, Leon, Elements of Pure Economics, translated by W. Jaffe, Homewood, Illinois, Richard Irwin, Inc., 1954.

presented by Professor Wassily Leontief in 1941.[1] Forty-four sector input-output tables representing the United States economy for the years 1919 and 1929 were presented. Later, Leontief constructed a table for 1939, used in analyzing postwar economic problems.[2]

While other national studies have since been made for Austria, Canada, Denmark, France, Germany, Great Britain, Israel, Italy, Japan, the Netherlands, Norway, and the USSR, the most elaborate table to date is the 450 sector table for the United States, constructed by the United States Bureau of Labor Statistics for 1947.[3]

Theoretical regional input-output models, defining industries spacially as well as by type, were developed by Isard,[4] Chenery,[5] and Leontief.[6] These were followed by empirical studies for regions of the United States including the work by Moses at Harvard.[7] The Moore and Peterson models for Utah[8] and California,[9] the University of Maryland's model of Maryland,[10]

1/ Leontief, Wassily, The Structure of the American Economy, 1919-1939, 2nd ed., New York, Oxford University Press, 1951.

2/ Ibid., and Members of the Harvard Economics Research Project, Studies in the Structure of the American Economy, New York, Oxford University Press, 1959.

3/ Evans, W. Duane, and Marvin Hoffenberg, The Interindustry Relations Study for 1947, Bureau of Labor Statistics, December 26, 1950.

4/ Isard, Walter, "Interregional and Regional Input-Output Analysis: A Model of a Space Economy," The Review of Economics and Statistics, Vol. 33, 1951, pp. 318-328.

5/ Chenery, Hollis B., Paul G. Clark, and Vera Cao Pinna, The Structure and Growth of the Italian Economy, (Special Mission to Italy for Economic Cooperation) Rome, Italy, Mutual Security Agency, 1953.

6/ Leontief, Wassily, and Members of the Harvard Economics Research Project, Studies in the Structure of the American Economy, New York, Oxford University Press, 1959.

7/ Moses, Leon N., "The Stability of Interregional Trading Patterns Input-Output Analysis," American Economics Review, Vol. 45, December 1955.

8/ Moore, Frederick T., and James W. Peterson, "An Interindustry Model of Utah," Review of Economics and Statistics, Vol. XXXVIII, November 1955.

9/ Ibid., A 56 Sector Interindustry Table of California for 1947, unpublished.

10/ University of Maryland, Bureau of Business and Economic Research, "A Regional Interindustry Study of Maryland," Studies in Business and Economics, Vol. 8, No. 2, September 1954.

Hoch's Chicago model for the Chicago Area Transportation Study,[1] Hirsch's study of the St. Louis area,[2] and Iowa State's series of models by Heady, Peterson,[3] Schnittker,[4] and Carter.[5] With the exception of the Iowa State models, all models of United States regions were for the year 1947. The basic source of data for most of these regional studies was the comprehensive 1947 input-output model for the United States constructed by the Bureau of Labor Statistics.[6]

The Iowa State models emphasized agriculture, as does the present California model. Peterson had five sector models for 1929, 1939, and 1949. Schnittker expanded on Peterson's work in constructing a regional model of agriculture for 1949. Carter constructed a 10-agricultural-region model for 1954.

Chenery and Clark[7] used regional input-output analysis to study economic development in northern and southern Italy. In general, a regional input-output model differs from the basic model only in that another dimension--space or location--is included.

The Basic Model

An input-output model is a set of linear equations describing inter-sector flows of goods and services. Three separate stages of analysis are involved. In the first stage, a flow table is constructed in which the output of each sector of an economy is allocated to every sector that uses this output. For this stage of analysis, physical units may be used, but, to facilitate later analysis and to aggregate into a workable number of sectors, all flows

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1/ Hoch, Irving, Chicago Area Transportation Study: Forecasting Economic Activity for the Chicago Region, Chicago, May 1959.

2/ Hirsch, Werner Z., "Interindustry Relations of a Metropolitan Area," The Review of Economics and Statistics, Vol. XLI, November 1959.

3/ Peterson, G. A., and Earl O. Heady, Applications of Input-Output Analysis to a Simple Model Emphasizing Agriculture, Iowa Agr. Expt. Sta. Bul. 427, 1955.

4/ Schnittker, John Alvin, and Earl O. Heady, Application of Input-Output Analysis to a Regional Model Emphasizing Agriculture, Iowa Agr. Expt. Sta. Res. Bul. 454, 1958.

5/ Carter, Harold O., and Earl O. Heady, An Input-Output Analysis Emphasizing Regional and Commodity Sectors of Agriculture, Iowa Agr. Expt. Sta. Res. Bul. 469, 1959.

6/ Evans and Hoffenberg, op. cit.

7/ Chenery, Clark, and Pinna, op. cit.

are generally converted to money units, usually the value to the producer.[1/] A complete "accounting" of the flows of all goods and services from one sector to another results. If it is assumed that constant input-output ratios hold for each and every sector, all sectors become endogenous and the system is referred to as a "closed" model.[2/] A more common assumption, however, is that constant input-output ratios hold only for those sectors normally considered as intermediate production activities, while final demand activities such as households and governments are autonomous. Where this assumption is made the system is termed "open."

An open system may be described mathematically as in (1) below, in which

$i, j = 1, 2, 3 \ldots n$

X_i is the output of sector i, and

x_{ij} is the amount of output of sector i purchased by sector j . Y_i denotes the final demand for goods of sector i.

$$
\begin{aligned}
X_1 &= x_{11} + x_{12} + \ldots + x_{ij} + \ldots + x_{1n} + Y_1 \\
X_2 &= x_{21} + x_{22} + \ldots + x_{2j} + \ldots + x_{2n} + Y_2 \\
&\;\;\vdots \\
X_i &= x_{i1} + x_{i2} + \ldots + x_{ij} + \ldots + x_{in} + Y_i \\
&\;\;\vdots \\
X_n &= x_{n1} + x_{n2} + \ldots + x_{nj} + \ldots + x_{nn} + Y_n
\end{aligned}
\qquad (1)
$$

If the x_{ij} for i = j are excluded, outputs are "net" quantities. Where the x_{ij} are included for all ij the outputs are "gross" quantities. If all inputs into a sector are recognized (including depreciation, profits, and taxes), the sum of the value of inputs to a particular sector will equal the value of output--that is, the sums of corresponding columns and rows are equal.

1/ Some studies have been constructed on the basis of value to the purchaser. In either case, the margin (the difference between the producers' and purchasers' value) is allocated from sectors such as "Trade" or "Transportation" which do not give or receive flows of physical goods in the interindustry sense. For an example of a study using purchasers' value, see the Chenery and Clark study of the Italian Economy.

2/ Implicit in this assumption is that households, whose output is labor, managerial, and entrepreneurial services, would require a fixed mix of inputs (i.e., consumption goods such as food, clothing, etc.) per unit of output.

In the second stage, a matrix of technical coefficients is developed. Here, the basic assumption of input-output analysis is involved. A linear relationship is assumed to exist between the purchases of an endogenous sector and the level of output of that sector, as provided in equation (2a).

(2a) $$x_{ij} = a_{ij}X_j + c_{ij}$$

in which a_{ij} and c_{ij} are constants, x_{ij} is the amount of output of sector i purchased by sector j, and X_j is the output of sector j. To facilitate empirical work, c_{ij} is assumed to be zero. The technical coefficient a_{ij} is thus derived from a single observation of the ratio $\frac{x_{ij}}{X_j}$, which is the purchase of output of industry i by industry j, divided by the gross output of industry j, as shown in (2b).

(2b) $$a_{ij} = \frac{x_{ij}}{X_j}$$

Each sector of the endogenous part of the model is now described in terms of a common unit: dollar inputs per dollar of output. The direct dependence of each sector on any other sector is now quantifiable (under the assumption stated).

The third, and perhaps most useful, matrix summarizes not only the direct dependence, but also the indirect and circular effects of one sector on another. Each interdependence coefficient shows the output required from sector i per dollar of output of sector j delivered to final demand (the ultimate user). The interdependence coefficients are computed directly from the second matrix, being the inverse of the difference between an identity matrix and the matrix of technical coefficients. The mathematical development is as follows: Substituting equation (2b) into (1) yields:

(3a)
$$\begin{aligned}
X_1 - a_{11}X_1 - a_{12}X_2 - \cdots - a_{1j}X_j - \cdots - a_{1n}X_n &= Y_1 \\
X_2 - a_{21}X_1 - a_{22}X_2 - \cdots - a_{2j}X_j - \cdots - a_{2n}X_n &= Y_2 \\
\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots & \\
\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots & \\
X_i - a_{i1}X_1 - a_{i2}X_2 - \cdots - a_{ij}X_j - \cdots - a_{in}X_n &= Y_i \\
\vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots \quad \vdots & \\
X_n - a_{n1}X_1 - a_{n2}X_2 - \cdots - a_{nj}X_j - \cdots - a_{nn}X_n &= Y_n
\end{aligned}$$

or, in matrix notation,

(3b) $$X - AX = Y$$

where X is a $1 \times n$ column vector of outputs, A is a matrix of technical coefficients of dimensions $n \times n$ and Y is a $1 \times n$ column vector of final demands.

With specified final demands $Y_1, Y_2, Y_i, \ldots, Y_n$ and constant input-output coefficients, a_{ij}, equations (3a) can be solved for the outputs $X_1, X_2, \ldots X_n$ needed to supply specified deliveries to final demand. This final system of equations is given in (4a) where the A_{ij} are resulting interdependence coefficients.

(4a)
$$\begin{aligned}
X_1 &= A_{11}Y_1 + A_{12}Y_2 + \ldots + A_{1j}Y_j + \ldots + A_{1n}Y_n \\
X_2 &= A_{21}Y_1 + A_{22}Y_2 + \ldots + A_{2j}Y_j + \ldots + A_{2n}Y_n \\
&\vdots \\
X_i &= A_{i1}Y_1 + A_{i2}Y_2 + \ldots + A_{ij}Y_j + \ldots + A_{in}Y_n \\
&\vdots \\
X_n &= A_{n1}Y_1 + A_{n2}Y_2 + \ldots + A_{nj}Y_j + \ldots + A_{nn}Y_n
\end{aligned}$$

or, in matrix notation,

(4b) $$X = (I - A)^{-1}Y \quad \text{in which}$$

I is an identity matrix of the same dimensions as A.

Underlying Assumptions

The assumptions and the validity of the assumptions of input-output analysis are discussed in detail by Cameron, Dorfman, et al., Hatanaka, Leontief, Martin, and others.[1/] The essential assumptions are concerned with the nature of production: (1) Input-output coefficients are assumed fixed and (2) aggregation errors are absent in combining industries or commodities into a manageable number of sectors.

1/ Cameron, B., "The Production Function Leontief Models," Review of Economic Studies, Vol. XX, No. 1, pp. 62-69; Chenery, Hollis B., and Paul G. Clark, Interindustry Analysis, New York, John Wiley and Sons, Inc., 1959; Dorfman, Robert, Paul A. Samuelson, and Robert M. Solow, Linear Programming and Economic Analysis, New York, McGraw-Hill Book Co., 1958; Hatanaka, M., Testing the Workability of Input-Output Analyses, Princeton, 1957, Mimeo; Leontief, Wassily, and Members of the Harvard Economics Research Project, op. cit; Martin, William E., "A California Interindustry Analysis Emphasizing Agriculture," Ph.D. thesis, University of California, 1961, pp. 13-20.

The fixed coefficient assumption has several implications which are normally considered contradictory to actual production possibilities. It implies that all inputs are uniformly affected by a change in the scale of production, thus ignoring the distinction between fixed and variable inputs and between the short- and long-run. It assumes that substitution possibilities due to changes in relative prices or availabilities are unimportant. Cameron[1/] in a times-series analysis of selected input coefficients in 52 Australian industries concluded that his results generally supported the assumption of fixed production coefficients in the short-run. Yet, Chenery[2/] in a broad review of the accomplishments in this area only infers that because of the properties of input-output matrices, errors in the coefficients do not lead to cumulative errors in the solutions, but on the contrary tend to compensate for each other; the most important coefficients should be discovered and additional attention devoted to quantifying these, while assuming small errors in the great bulk of the coefficients will not cause difficulties.

Continuing technological changes, however, make it advisable for complete or partial revisions of input-output tables every four or five years.

III. THE CALIFORNIA MODELS

The California models were conceived to examine the interdependence between the agricultural and the nonagricultural sectors of the economy, both within-state and between California and areas outside of California (primarily the other states). However, while the agricultural emphasis is the most striking difference between California and most previous input-output formulations,[3/] this difference is largely in the level of sector aggregation.

An important characteristic of any input-output model is its handling of imports and exports. The California models distribute domestically produced output from individual production sectors. Net import distributions are aggregated into a single net import sector. Net exports are distributed to a single export sector. Because of the import-export structure used, interdependency coefficients show output required from California producers in response to final demand for California products, regardless of the region where final demand originates.

1/ Cameron, B., op. cit.

2/ Chenery, Hollis B., and Paul G. Clark, op. cit.

3/ Iowa State has also presented a series of interindustry models emphasizing agriculture (see references listed on pages 4 and 5).

The specific mathematical formulation of the California models follows. Included are the mathematics and theory of related analytical measures used in interpreting the results of the empirical solutions.

Mathematical and Theoretical Formulation of the California Models

Model I

The Basic Formulation.--Model I may be described mathematically as in equations (5a) in which X is the gross domestic output of sectors i or k; i denotes endogenous sectors and k denotes exogenous sectors; x is the output of the producing industry i or k purchased by endogenous sector j; Y is final demand for sectors i or k; and the subscript h denotes the sector of domestic final demand. The superscript o. indicates goods imported into California, while the superscript .o indicates goods exported from California. Where no superscripts are present, the goods were both produced and consumed within the state.

$i = 1,2, \ldots 26$ $\qquad$ $j = 1,2, \ldots 26$

$k = 27,28, \ldots 33$ $\qquad$ $h = 1,2, \ldots 10$

Under the assumptions of input-output theory, $X_i = \sum_{i=1}^{26} x_{ij} + \sum_{k=27}^{33} x_{kj}$ for all X_i where $i = j$.

Equations (5a) may be written more concisely as equations (5b)[1/]

$$X_i = \sum_{j}^{26} x_{ij} + \sum_{h}^{10} Y_{ih} + Y_i^{\cdot o}$$

(5b)
$$X_{27}^{o\cdot} = \sum_{j}^{26} x_{27j}^{o\cdot} + \sum_{h}^{10} Y_{27h}^{o\cdot}$$

$$X_k = \sum_{j}^{26} x_{kj} + \sum_{h}^{10} Y_{kh} + Y_k^{\cdot o}$$

where $i,j = 1,2,\ldots 26$; $k = 28,29,\ldots 33$; $h = 1,2,\ldots 10$.

Constant technical coefficients are assumed for all X_i industries as in equation (6)

(6)
$$a_{ij} = \frac{x_{ij}}{X_j}$$

1/ Note that the endogenous section of the model is symmetrical (i.e., each sector has both an output row and an input column). In the exogenous portion of the model, however, there are 7 rows and 11 columns. Discussion related to this point is given later in this section.

$$
\begin{aligned}
X_1 &= x_{1.1} + x_{1.2} + \cdots + x_{1.j} + \cdots + x_{1.26} + Y_1^{\cdot o} + Y_{1.1} + Y_{1.h} + \cdots + Y_{1.10} \\
X_2 &= x_{2.1} + x_{2.2} + \cdots + x_{2.j} + \cdots + x_{2.26} + Y_2^{\cdot o} + Y_{2.1} + Y_{2.h} + \cdots + Y_{2.10} \\
&\vdots \\
X_i &= x_{i.1} + x_{i.2} + \cdots + x_{i.j} + \cdots + x_{i.26} + Y_i^{\cdot o} + Y_{i.1} + Y_{i.h} + \cdots + Y_{i.10} \\
&\vdots \\
X_{26} &= x_{26.1} + x_{26.2} + \cdots + x_{26.j} + \cdots + x_{26.26} + Y_{26}^{\cdot o} + Y_{26.1} + Y_{26.h} + \cdots + Y_{26.10} \qquad (5a) \\
X_{27}^{o\cdot} &= x_{27.1}^{o\cdot} + x_{27.2}^{o\cdot} + \cdots + x_{27.j}^{o\cdot} + \cdots + x_{27.26}^{o\cdot} + 0 + Y_{27.1}^{o\cdot} + Y_{27.h}^{o\cdot} + \cdots + Y_{27.10}^{o\cdot} \\
X_{28} &= x_{28.1} + x_{28.2} + \cdots + x_{28.j} + \cdots + x_{28.26} + Y_{28}^{\cdot o} + Y_{28.1} + Y_{28.h} + \cdots + Y_{28.10} \\
&\vdots \\
X_k &= x_{k.1} + x_{k.2} + \cdots + x_{k.j} + \cdots + x_{k.26} + Y_k^{\cdot o} + Y_{k.1} + Y_{k.h} + \cdots + Y_{k.10} \\
&\vdots \\
X_{33} &= x_{33.1} + x_{33.2} + \cdots + x_{33.j} + \cdots + x_{33.26} + Y_{33}^{\cdot o} + Y_{33.1} + Y_{33.h} + \cdots + Y_{33.10}
\end{aligned}
$$

Substituting (6) into the top term of (5b) yields:

$$(7) \qquad X_i - \sum_{j}^{26} a_{ij} X_j = \sum_{h}^{10} Y_{ih} + Y_i^{\cdot o}$$

This equation is representative of the distribution of output for the 26 endogenous sectors. The system may be written in matrix form as in (8)

$$(8) \qquad X - AX = Y$$

in which X is a column vector of outputs (dimensions 1 x 26) A is the matrix of technical coefficients (dimensions 26 x 26), and Y is a column vector of final demands (dimensions 1 x 26). Solving (8) for the outputs required from each sector to deliver a specified final demand gives:

$$(9) \qquad X = (1-A)^{-1}Y \quad \text{in which}$$

I is an identity matrix of the same dimensions as A. This is identical to the solution shown in equation (4b), in the discussion of the basic theoretical model.

Interpretation of this solution is as follows: Given final demand for California products Y, and the matrix of interdependency coefficients $(I-A)^{-1}$, specific outputs are required of each California industry X. Consequently, given a change in final demand for California products, and the interdependency matrix, the change in required output from each California industry may be determined. Each interdependency coefficient (A_{ij}) must therefore be interpreted as showing the output required of industry i in response to one dollar's worth of final demand for products of industry j.

Output Multipliers.--Equation (10) shows the matrix of interdependency coefficients $(I-A)^{-1}$ written in expanded form.

$$(10) \qquad \begin{matrix} A_{1.1} & A_{1.2} & \cdots & A_{1.j} & \cdots & A_{1.26} \\ A_{2.1} & A_{2.2} & \cdots & A_{2.j} & \cdots & A_{2.26} \\ \cdot & \cdot & & \cdot & & \cdot \\ \cdot & \cdot & & \cdot & & \cdot \\ A_{i.1} & A_{i.2} & \cdots & A_{i.j} & \cdots & A_{i.26} \\ \cdot & \cdot & & \cdot & & \cdot \\ \cdot & \cdot & & \cdot & & \cdot \\ A_{26.1} & A_{26.2} & \cdots & A_{26.j} & \cdots & A_{26.26} \end{matrix}$$

If $A_{1.1}$ shows the output required of industry 1 to deliver one dollar's worth of products of industry 1 to final demand, $A_{2.1}$ shows the output required of industry 2 to deliver one dollar's worth of products of industry 1 to final demand, and $A_{i.1}$ shows the output required of industry i to deliver one dollar's worth of products of industry 1 to final demand, then the sum $A_{1.1} + A_{2.1} + \ldots + A_{i.1} + \ldots + A_{26.1}$ shows the total output required of all endogenous California sectors to deliver one dollar's worth of products of industry 1 to final demand. Corresponding interpretations may be made for each column of the interdependency matrix.

These column totals are termed output multipliers. Each output multiplier expresses the total change in the value of California's gross domestic output induced by a one dollar change in final demand for products of a particular industry.[1/] Each California sector may therefore be ranked in order of its relative total output inducing capability per dollar of final demand.

Weighted Output Multipliers.--Another useful comparison between sectors is the output multiplier weighted by a specified percentage change in final demand for each sector of the economy. This measure is shown in equation (11) where $\sum_{i}^{26} \Delta X_i$ expresses the total output change in the economy associated with a specified final demand change (ΔY_j) for sector j; $\sum_{i}^{26} A_{ij}$ is the output multiplier for sector j.

$$(11) \qquad \sum_{i}^{26} \Delta X_i = \left[\sum_{i}^{26} A_{ij}\right] \Delta Y_j$$

1/ How does this multiplier compare with the widely discussed "investment multiplier" of Keynesian theory? Both multipliers reflect changes in national (or state) product resulting from changes in consumption or investment. However, the investment multiplier implies the adjustment of the economy to a general equilibrium solution of consumption, savings, and investment. Input-output analysis does not present general equilibrium solutions. It is a technical production analysis showing interdependence between industries. The economic "balance" of income, savings, and investment are not considered, nor are equilibrium conditions implied.

There is an input-output multiplier for each sector of the economy. Each multiplier expresses the aggregate effect on state production (excluding production of sectors not considered endogenous to the system) caused by a specified change in a particular final demand, given the technical production requirements of each industry. Because output of certain sectors is considered exogenously determined, solutions are "partial" rather than "complete." For example, further consumption by households (and its multiplying effects on output) in response to increased income generated by increased production generated by an original increase in household demand is not reflected. These income effects are critical for Keynesian multipliers. Keynesian multipliers do not, however, specify particular interrelationships between industries.

Direct Versus Indirect Output Changes.--Each interdependence coefficient (A_{ij}) relates required direct and indirect inputs to final demand, while each technical coefficient (a_{ij}) relates direct inputs to output. Therefore, corresponding coefficients of the A (technical coefficient) matrix and the $(I-A)^{-I}$ (interdependence) matrix are not directly comparable. However, interdependence coefficients (A_{ij}) may be "scaled down" to reflect only the direct and indirect effects of output changes by dividing each column entry (see equation (10)) by that column's diagonal element. That is, each A_{ij} is divided by its corresponding A_{ij} for $i = j$. The result is to net out internal flows (requirements from industry i by industry i) generated by final demand for industry i as well as further flows from other sectors induced by these internal flows. Output requirements from industry i per dollar of final demand for industry i are now exactly one dollar. Output requirements from other sectors per dollar of final demand for industry i are thus, in effect, per dollar of output of industry i.

The difference between corresponding a_{ij} and "adjusted" A_{ij} now make clear the magnitude of the indirect requirements of one sector by another per dollar of output.

Input Requirements of Primary Resources.--The available supply of primary resources inputs such as land, water, or labor is not considered a function of the "open" input-output system, as are the supplies of most produced inputs, but rather as given. Inputs of these resources are a function of output, however, and thus are a function of final demand.

The interdependency matrix of the California input-output model provides the basis for predicting individual sector outputs (X) given a specified level of final demand (Y). This relationship was expressed by equation (9). If the functional relationship between resource requirements and output is specified, total resource requirements given final demand may be computed. That is, where r_{kj} is the amount of primary resource k required by sector j and X_j is the output of sector j.

$$r_{kj} = f(X_j) \tag{12}$$

X_j is computed from equation (9) and substituted into equation (12). No restriction is necessary on the specific form taken by equation (12). However, for empirical purposes a simplifying assumption as to the form of this relationship is made as given in equation (13).

$$r_{kj} = b_{kj}X_j + c_{kj} \tag{13}$$

where b_{kj} is a constant and c_{kj} equals zero. Technical coefficients b_{kj} are thus derived from a single observation of the ratio $\frac{r_{kj}}{X_j}$ as shown in (14).

(14) $$b_{kj} = \frac{r_{kj}}{X_j}$$

Define R_k as the total California requirement for resource k. Thus, in algebraic terms

(15a) $$R_k = \sum_{j=1}^{n} r_{kj} = \sum_{j=1}^{n} b_{kj}X_j$$

or in matrix notation

(15b) $R_k = b_kX$, where b_k is k^{th} row of the resource matrix B.

For all primary resources, the corresponding equation is:

(15c) $R = BX$ where R is k x 1, B is k x n, and X is n x 1.

Substituting X from equation (9) into equations (15b) and (15c), equations (16a) and (16b) are obtained.

(16a) $$R_k = b_k(I-A)^{-1} Y$$

(16b) $$R = B(I-A)^{-1} Y$$

Thus by multiplying the matrix of primary resource technical coefficients B, times the matrix of interdependency coefficients $(I-A)^{-1}$, a matrix of coefficients $\left[B(I-A)^{-1}\right]$ expressing primary resource inputs per dollar of delivery to final demand is created. Define this matrix as P (with dimensions k x n), and coefficients of this matrix as P_{kj}. That is, for every dollar's worth of final demand for products of sector j, P_{kj} units (not necessarily dollars) of resource k are required--directly by producing sector j and indirectly through requirements induced in other sectors of the economy.

Model II

Model II is a minor modification of Model I involving the distribution of depreciation. Because the modifications involved are of primary interest only to the input-output researcher, a full discussion of Model II is reserved for Part II of this study.

Model III

In Model I only two areas are involved, California and the rest of the world. Model III presents a spacial disaggregation of Model I. California is divided into a northern and a southern region as indicated in Figure 1.

Figure 1. Regional Division of California, Model III.

Measures developed for analysis of Model I may be used with only minor modification for analysis of Model III. Specific differences in mathematical formulation and interpretation are presented below.

Mathematical Formulation.--The north-south input-output system may be described algebraically by expanding the system of equations (5a) as in (17). The addition of the superscripts n for north and s for south make clear the regions of production and destination. The left superscript indicates the region of production, while the right superscript indicates the region of destination. There are 26 endogneous and 6 exogenous sectors in each of the California regions. One additional sector contains all imports from outside of the state. The X are gross outputs, the x are inputs of the row sector to the column sector, and the Y are final demands as defined for Model I.

Technical coefficients (a_{ij}) are derived as for Model I. That is, constant technical coefficients are assumed for all 52 of the northern and southern industries considered endogenous to the model. Interpretation of the a_{ij} is as follows:[1/]

1. a_{ij}^{nn} are direct inputs from northern sector i to northern sector j per dollar of output of northern sector j.
2. a_{ij}^{ss} are direct inputs from southern sector i to southern sector j per dollar of output of southern sector j.
3. a_{ij}^{ns} are direct inputs from northern sector i to southern sector j per dollar of output of southern sector j.
4. a_{ij}^{sn} are direct inputs from southern sector i to northern sector j per dollar of output of northern sector j.

Substituting appropriate a_{ij} into the first 52 equations of equations (17) and reducing to matrix notation gives equation (18a).

(18a)
$$\left[\begin{array}{c} X^n \\ \hline X^s \end{array}\right] = \left[\begin{array}{c|c} a_{ij}^{nn} & a_{ij}^{ns} \\ \hline a_{ij}^{sn} & a_{ij}^{ss} \end{array}\right] \left[\begin{array}{c} X^n \\ \hline X^s \end{array}\right] + \left[\begin{array}{c} Y^n \\ \hline Y^s \end{array}\right]$$

The X and Y vectors are partitioned into two portions of dimensions 26 x 1 each, while the A matrix is partitioned into four portions of dimensions 26 x 26 each.

1/ Fixed technical coefficients also imply fixed trading patterns between regions and from outside California. This assumption is reasonable in terms of the objectives of the study to show and analyse sector interrelationships. Fixed trading patterns may be too restrictive for projections of output over time since domestic inputs and imported inputs per unit of output are subject to change.

(17)

$$
\begin{aligned}
X_1^n &= x_{1.1}^{n.n} + x_{1.2}^{n.n} + \ldots + x_{1.26}^{n.n} + x_{1.1}^{n.s} + \ldots + x_{1.26}^{n.s} + Y_1^{n.o} + Y_{1.h}^{n.n} + Y_{1.h}^{n.s} \\
X_2^n &= x_{2.1}^{n.n} + x_{2.2}^{n.n} + \ldots + x_{2.26}^{n.n} + x_{2.1}^{n.s} + \ldots + x_{2.26}^{n.s} + Y_2^{n.o} + Y_{2.h}^{n.n} + Y_{2.h}^{n.s} \\
&\vdots \\
X_{26}^n &= x_{26.1}^{n.n} + x_{26.2}^{n.n} + \ldots + x_{26.26}^{n.n} + x_{26.1}^{n.s} + \ldots + x_{26.26}^{n.s} + Y_{26}^{n.o} + Y_{26.h}^{n.n} + Y_{26.h}^{n.s} \\
X_1^s &= x_{1.1}^{s.n} + x_{1.2}^{s.n} + \ldots + x_{1.26}^{s.n} + x_{1.1}^{s.s} + \ldots + x_{1.26}^{s.s} + Y_1^{s.o} + Y_{1.h}^{s.n} + Y_{1.h}^{s.s} \\
&\vdots \\
X_{26}^s &= x_{26.1}^{s.n} + x_{26.2}^{s.n} + \ldots + x_{26.26}^{s.n} + x_{26.1}^{s.s} + \ldots + x_{26.26}^{s.s} + Y_{26}^{s.o} + Y_{26.h}^{s.n} + Y_{26.h}^{s.s} \\
X_{27}^o &= x_{27.1}^{o.n} + x_{27.2}^{o.n} + \ldots + x_{27.26}^{o.n} + x_{27.1}^{o.s} + \ldots + x_{27.26}^{o.s} + 0 + Y_{27.h}^{o.n} + Y_{27.h}^{o.s} \\
X_{28}^n &= x_{28.1}^{n.n} + x_{28.2}^{n.n} + \ldots + x_{28.26}^{n.n} + 0 + \ldots + 0 + 0 + Y_{28.h}^{n.n} + 0 \\
&\vdots \\
X_{33}^n &= x_{33.1}^{n.n} + x_{33.2}^{n.n} + \ldots + x_{33.26}^{n.n} + 0 + \ldots + 0 + 0 + Y_{33.h}^{n.n} + 0 \\
X_{28}^s &= 0 + 0 + \ldots + 0 + x_{28.1}^{s.s} + \ldots + x_{28.26}^{s.s} + 0 + 0 + Y_{28.h}^{s.s} \\
&\vdots \\
X_{33}^s &= 0 + 0 + \ldots + 0 + x_{33.1}^{s.s} + \ldots + x_{33.26}^{s.s} + 0 + 0 + Y_{33.h}^{s.s}
\end{aligned}
$$

If regions of origin for output (X) and final demand (Y) and regions of origin and destination for technical coefficients a_{ij} are not specifically designated, further economy of notation may be used as in equation (18b).

(18b) $$X = A X + Y$$

The solution for X here has the same general form as the solution for X in Model I. That is,

(19) $$X = (I-A)^{-1} Y$$

The matrix of interdependence coefficients, $(I-A)^{-1}$, may be written as in equation (20).

(20) $$\left[\begin{array}{c|c} A_{ij}^{nn} & A_{ij}^{ns} \\ \hline A_{ij}^{sn} & A_{ij}^{ss} \end{array}\right]$$

Each A_{ij} submatrix is of dimensions 26 x 26. Interpretation of these interdependency coefficients (A_{ij}) is as follows:

1. A_{ij}^{nn} show the direct and indirect requirements for products of northern sector i per dollar of final demand for products of northern sector j.
2. A_{ij}^{ss} show the direct and indirect requirements for products of southern sector i per dollar of final demand for products of southern sector j.
3. A_{ijl}^{ns} show the direct and indirect requirements for products of northern sector i per dollar of final demand for products of southern sector j.
4. A_{ij}^{sn} show the direct and indirect requirements for products of southern sector i per dollar of final demand for products of northern sector j.

Final demand for products of each region may occur either in the region of production, the other California region, from outside of the state, or from any combination of these sources.

Multipliers.--As with Model I, multipliers showing total requirements from all sectors of the economy per dollar of final demand of one sector are computed by summing the A_{ij} for corresponding j. In addition, regional multipliers are computed. For example, $\sum_{i}^{26} A_{ij}^{nn}$ shows the total requirements of northern sectors per dollar of final demand for products of northern sector j; $\sum_{i}^{26} A_{ij}^{sn}$ shows total requirements of southern sectors per dollar of final

demand for products of northern sector j. Similar interpretations may be made for sums of other regional interdependency coefficients.

Other analytical measures described for Model I are not computed for Model III. They are, of course, fully applicable with minor modifications of interpretation to account for the two California regions.

Definitions and Classifications

Sector Classifications

Brief descriptions of the specific sectors included in the models follow. Although an attempt was made to aggregate industries that are homogeneous in both input structure and product type, other important considerations were (1) the form of secondary data sources, (2) available time and funds (the number of cells in the table (the x_{ij}) increases by the square of the number of sectors used), and (3) the stated objective of emphasizing agriculture.

The 26 endogenous sectors include 10 agricultural sectors, 5 agricultural processing sectors, 7 manufacturing and mining sectors, 3 service sectors, and one sector including all of the "margin" (wholesale and retail trade and transportation) industries. The 7 other input supplying sectors, assumed to be exogenous, include (1) scrap and byproducts, (2) maintenance construction, (3) new construction, (4) state and local government, (5) federal government, (6) households, and (7) net imports from out-of-state.

Agricultural sectors, partially because of data availability, are classified on a product rather than an enterprise basis; that is, for example, a "cotton" sector is designated instead of a crop farm sector. One advantage with this classification is in the comparative simplicity of valuing and distributing each sector's output. Thus, because coverage of crop and livestock statistics is relatively complete, the 10 agricultural rows were easier to construct than any other segment of the model.

Although the product type classification is an advantage in distributing the output of agriculture, it is a disadvantage, at least conceptually, in specifying agriculture's input structure. Costs, which were obviously joint costs, are in some cases arbitrarily divided between two or more producing sectors. Nonetheless, secondary data sources showing purchases of agriculture from industry are reasonably accessible with only minor modification and adjustments.

The processing, manufacturing, and some transportation industries are classified on an establishment basis to conform to the Standard Industrial Classification (SIC) system used by the Bureau of the Census and the sector classification of the 1947 BLS and 1955 USDA studies.[1/] The service, trade, and some transportation industries are classified on an activity basis for the same reasons. Mining is classified on a product basis as is agriculture.

Where no compelling requirement of the analysis planned forces industry classifications to be changed from previous similar models, it is advantageous to follow classification precedents. Thus, data from previous models may be adapted to the present model where no current data is available, and the several systems may be compared for changes in structure over time. While industry classifications of the California models in general follow the precedents of the BLS and U. S. Department of Agriculture studies, aggregation of industries into sectors differ due to the objectives of the analysis.

Brief definitions of the commodity or industry included in each sector are given below.

Endogenous Sectors.--

UC 1 Meat animals and products--beef, hogs, sheep and lambs, wool and mohair.

UC 2 Poultry and eggs--chickens, eggs, broilers, turkeys and turkey eggs, other poultry and eggs, and hatcheries.

UC 3 Farm dairy products--milk, cream, and dairy animals sold for meat.

UC 4 Food and feed grains--wheat, rye, rice, corn, barley, oats, sorghum, corn and sorghum silage and forage.

UC 5 Cotton--cotton lint and cottonseed.

UC 6 Vegetables--Irish potatoes, sweet potatoes, melons, dry beans and peas, strawberries, all other vegetables.

UC 7 Fruit (excluding citrus) and nuts--apples, apricots, cherries, nectarines, peaches, pears, persimmons, plums, prunes, pomegranates, avocados, dates, figs, olives, grapes, tree nuts, bushberries.

UC 8 Citrus fruit--oranges, tangerines, lemons, grapefruit, limes, satsumas.

1/ For complete sector definitions as well as methods and references used in estimating intersector flows, see: Martin and Carter, op. cit. Tables S.1 and S.2 in Part II define each UC sector in relation to the sectors of the 1955 USDA and 1947 BLS models.

UC 9 Forage crops--hay and pasture.

UC 10 Miscellaneous agriculture--legume and grass seed, vegetable seeds, greenhouse and nursery products, on-farm forest products, sugar beets, oil crops, miscellaneous crops, horses and mules, honey and beeswax, agricultural services, hunting and fishing.

UC 11 Grain mill products--flour and meal, cereal breakfast foods, rice milling, blended and prepared flour, prepared animal feeds.

UC 12 Meat and poultry processing--meat packing, prepared meats, poultry dressing plants.

UC 13 Dairy products--creamery butter, natural cheese, concentrated milk, ice cream and ices, special dairy products, fluid milk.

UC 14 Canning, preserving, freezing--canned seafood, cured fish, canning and preserving food, dehydrated fruits and vegetables, pickles and sauces, packaged seafood, frozen fruit and vegetables.

UC 15 Miscellaneous agricultural processing--bakery products including bread baked at single retail outlets, sugar, miscellaneous food preparations, alcholic beverages, tobacco products.

UC 16 Chemicals and fertilizers--chemicals, plastics, synthetic rubber, explosives, drugs and medicines, soap and related products, paints and varnishes, fertilizers, animal and vegetable oils.

UC 17 Petroleum--crude petroleum and natural gas, petroleum products, coke and products, paving and roofing materials.

UC 18 Fabricated metals and machinery--fabricated metals, machinery, electrical machinery, transportation equipment (excluding aircraft).

UC 19 Aircraft--aircraft and parts.

UC 20 Primary metals--steel, foundries and forgings, nonferrous metals, nonferrous foundries.

UC 21 Other manufacturing--textiles, logging, wood products, furniture, paper products, printing and publishing, rubber products, leather products, clay and glass products.

UC 22 Mining--all mining except for liquids and gases.

UC 23 Utilities--electric light and power; natural, manufactured, and liquefied petroleum gas; telephone and telegraph.

UC 24 Selected services--eating and drinking establishments, hotels and camps, laundries and dry cleaning, other personal services, business services, auto repair shops and garages, other repair services, motion picture theaters and other amusements.

UC 25 Trade and transportation--railroads, trucking, warehousing and storage, water transportation, air transportation, pipeline transportation, wholesale and retail trade.

UC 26 Unallocated services--banking and finance, real estate and rentals, medical and dental, nonprofit institutions including education, advertising, small arms production, motion picture production.

Exogenous Sectors.--The endogenous section of the model is constructed symmetrically, i.e., each sector has both an output row and an input column. In constrast, there are 7 rows and 11 columns in the exogenous portion of the California model. The gross private capital accumulation sector, for example, is aggregated with the household row, yet appears as a separate input column. In other cases, such as for governments, the total value of inputs need not equal total value of output even though there is both a government row and a corresponding government column. For these reasons, the exogenous sectors are discussed in greater detail than are the endogenous sectors. Additional detail is also presented in Part II of this report.[1/]

UC 27, Scrap and By-Products.--Commodities considered as scrap or by-products, produced by the 26 endogenous sectors, are distributed to a special "dummy" sector, outside the endogenous system. These commodities are then distributed to the using sector from a scrap and by-products row. This is done so that an increased demand for (say) shoes does not imply increased output of the meat animal sector, of which hides are a by-product. In our present day economy, leather shoes are produced because hides are available at a relatively low cost; hides are not produced because they are needed for shoes, but because they are a joint produce (of very low value) in the production of beef. Some of the main commodities considered as by-products in this study are farm hides, dairy culls, cottonseed, grain mill cleanings and sweepings, brewers' and distillers' dried grains, vegetable cake and meal, animal oils, packers' hides, molasses, cotton linters, coke oven gas, gold and silver from the primary metals industries, and blast furnace gas. In addition, the value of metal and nonmetal wastes was estimated without specifying particular commodities.

UC 28, Net Imports and Net Exports.--The primary modification of the general model needed to construct a regional model involves specifying regional imports and exports. Ideally, therefore, detailed import-export data by type and value of product are needed. Such information is extremely limited. Interstate Commerce Commission railroad waybill statistics are available for most products transported, but for the purpose of input-output analysis where detailed flow data are necessary, data giving tonnages of rather heterogeneous classes of freight are inadequate.

In the absence of adequate import-export data, the procedure followed for Model I was to specify the total amount of each product used in the state by

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1/ Martin, William E., and Harold O. Carter, op. cit.

both producers and consumers, compare the total with the total output produced in the state, and assume that the difference was either a net import or export, as the case might be. The imports and exports of this model are, therefore, net relationships--any counterbalancing commodity flows across the state line within the same aggregate sector are ignored.

With imports recorded as a net relationship, and no information as to whether a particular industry uses domestically produced or imported inputs, a further assumption was necessary in order to scale the distribution of inputs from a sector down to domestically produced goods only. It was assumed that each sector imported a particular class of goods in proportion to its relative use of that good.[1/] For example, if agriculture used 6 percent, nonagricultural industry 71 percent, and final demand 23 percent of the total value of chemicals and fertilizers consumed in the state, these sectors divided the value of imports in the same proportions. Conversely, available domestic output was distributed in the same proportions.

Technical coefficients of producing sectors express the amount of a domestically produced good required to produce one dollar of a sector's output. Technical coefficients of the import sector, express the value of all imports required to produce one dollar of a sector's output. All imports into the state are aggregated, and appear in the single net import row. Neither the sum of the net import row, nor the sum of the net export column, has any comparability to published trade data. Since imports and exports are recorded on a net basis, the sums are functions of the particular aggregation used. They are not, of course, equal.[2/]

In Model III, where California is divided into northern and southern regions, net imports and net exports were allocated as follows. If one California region was a net importer and the other California region a net exporter of the products of a sector, all possible flows between the two regions were satisfied before imports from or exports to the rest of the world were distributed. If the northern and southern regions were either both net importers or both net exporters, there are no net flows shown between California regions. This procedure requires no further assumptions than are used for Model I. The net flows to or from California are undisturbed.

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1/ This is an approximation to the assumption that all uses in a region constitute the market so that the supply pattern is determined by total demand. Although these assumptions are necessary, given present data sources, this does point to an important area for future work.

2/ The difference between total net imports and total net exports is California's balance of trade. Note, however, that net exports include most purchases by the federal government whether physically exported or not.

UC 29, Maintenance Construction.--Output includes the value of all maintenance work done on force account[1/] in addition to that done by construction contractors. Since the output of any sector in any year is not usually considered to be a linear function of the amount of construction purchased by the producing sector, neither UC 29 nor UC 30 is included in the endogenous section of the model.

UC 30, New Construction.--Output includes force account work as well as construction by contractors. Construction is defined as the design and erection of immobile structures and utilities, together with those service facilities which become an integral part of the structure. Oil well drilling is included.

UC 31, State and Local Government.--Outputs are the services rendered by state, county, city, special district, and school districts as measured by the amount of taxes paid by each sector of the economy. Note that taxes are considered government output rather than as inputs to government. Sectors buy output by paying taxes. Taxes are a production expense, as are purchases of other types of output. Inputs to government are the purchases of government from other sectors.

UC 32, Federal Government.--Output is the service rendered by the federal government as measured by the amount of taxes paid by each sector of the economy. Inputs are government purchases.

Government purchases of California products could not be estimated except for sectors whose output is mostly consumed in the region where produced. For other sectors, federal government purchases were ignored and are thus included in the net export sector. Since both net exports and federal government are a part of final demand, the usefulness of the model is not appreciably affected by this lack of data.

UC 33 and UC 34, Inventory Change.--These two sectors, inventory addition and inventory depletion, are included to reconcile current production with current consumption. All inventories are assumed to be held by the producing sector. For the manufacturing and processing industries, where specific data were not available, California was assumed to contribute its share to inventory change, as measured by the California sector's production relative to the United States sector's production.

UC 35, Gross Private Capital Formation.--Capital items such as machinery and new construction purchased by the private sectors of the economy are considered to be purchased by this "dummy" sector. Depreciation is then distributed

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1/ Force account construction, in contrast to contract construction, is performed by the purchasing industries' own employees.

to the using sector through the household sector. The exception to this rule is that in Model I and Model III machinery purchases by agriculture flow directly to agriculture. There are no exceptions in Model II.[1/] Capital items purchased by governments flow directly to governments in all models.

UC 36, Farm Households.--This sector is included in final demand only. Output of farm households is distributed as part of (row) sector UC 37 (other households); inputs to UC 36 include only home consumption of agricultural production (e.g., crops and livestock consumed on the farm where grown, urban vegetable gardens, and urban poultry production).

UC 37, Other Households.--Inputs to this sector are expenditures for goods and services by private individuals. The sum of all inputs (excluding taxes) approximates "personal consumption expenditure," as estimated in the national income accounts of the Department of Commerce. Household flows to other sectors are wages and salaries, proprietors' income, depreciation, and interest.

Regional Classification

Model I treats the entire state of California as a single economic unit. Model III recognizes the physical and "traditional" division of the state by the Tehachapi Mountains. In addition to the Tehachapis being the traditional dividing line between northern and southern California, they possess particular significance for economic analysis because of the increased transportation cost their presence entails. While moderate cost barriers are raised for transportation of certain bulky products such as hay and fluid milk, the mountains are a particularly effective barrier in the distribution of water. Since distribution of this resource may someday effectively dictate industry location, this boundary is an obvious choice for an interregional model.

This natural division of the state, used for Model III, is approximated by the northern boundaries of Santa Barbara, Ventura, Los Angeles, and San Bernardino counties (see Figure 1).

Definition of Output

Output is defined for each sector in Part II of this report. The "gross domestic output" of each sector is the total value to the producer of all goods and services produced within the region in question, including those goods and services which are both produced and consumed within the same sector.

1/ Model II is discussed in Part II of Martin and Carter, op. cit.

Selection of the Base Period

An input-output model is developed from data from one particular time period. All inputs and all outputs to and from each sector during this particular time period are recorded in the "flow" table. Each technical coefficient is thus developed from a single observation. Accounting practice make the calendar year the most practical base period for the model.

Although this study was begun in January of 1960, 1954 was the most recent year with adequate published data. The Census of Manufacturers[1/] and Census of Business[2/] were the critical sources since agricultural and mining data are adequate in any year. Even for agriculture, however, the selection of the calendar year 1954 was a convenient choice because of the 1954 Census of Agriculture,[3/] and the various government publications which grew out of the census report (especially the AMS report, Dollar Volume of Agriculture's Transactions with Industry[4/]).

Few general conclusions may be drawn as to the applicability of 1954 interrelationships for following years. California was at the bottom of a cyclical swing in general business activity.[5/] Yet, this says nothing of the individual cost-value output relationships that make up an input-output model. Inputs per unit of output may remain constant throughout changes in levels of business activity.

More may be said of the agricultural sectors of the model. In general, prices received by California farmers have remained stable since 1954 after falling drastically from the peaks of 1951 and 1952 (except for poultry and grain which have continued to fall). Costs (prices paid for manufactured goods) have risen slightly.

IV. EMPIRICAL RESULTS

The empirical results of the California models for 1954 are presented herein. Specific numbers are related to their mathematical counterparts so

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1/ U.S. Department of Commerce, Bureau of the Census, United States Census of Manufacturers, 1947, 1954, Washington, 1949, 1956.

2/ U.S. Department of Commerce, Bureau of the Census, Census of Business 1954, Washington, 1950, 1955.

3/ U.S. Department of Commerce, Bureau of the Census, 1954 Census of Agriculture, Washington, 1956, Vol. I, part 33, and Vol. II.

4/ Masucci, Robert H., op. cit.

5/ As indicated by California personal income data. U.S. Department of Agriculture, Office of Business Economics, U.S. Income and Output, A Supplement to the Survey of Current Business, Washington, 1958.

that facility in reading and interpretating the basic input-output tables may be obtained. Certain economic implications of these results for the California economy are included in the following sections. The potential uses and implications of the California models are many and varied, however. All cannot be investigated in this initial report. Therefore, much analysis must be left to the reader's ingenuity, in line with his particular economic interests.

Because the basic tables are printed oversize, they are located in Appendix A. Thus, text and tables may easily be consulted in conjunction with each other.

The Flow Tables

Table I-I (Appendix A) summarizes the interindustry flows of goods and services within, to, and from California in 1954 for Model I by sector of origin and destination. Data presented represent an aggregation of sectors initially prepared in approximately 200-sector detail. Although each figure is presented as a single valued estimate, they represent varying degrees of reliability. Consult Part II of this report for a discussion of estimation procedures and sources as well as for additional detail on sector flows.[1/]

The Row Entries

The entries in each row of Table I-I list in producers' prices the dollar amount of a California sector's output consumed by itself and each of the other sectors in the economy. For example (reading across the first row) sector 1, meat animals and products, sold $314,804,000 worth of products to meat and poultry processing (column 12) and $26,000 worth of products to the "other manufacturing" sector (column 21). Continuing across row 1 to the final demand columns, it may be seen that $147,000 worth of output was scrap or by-products (column 27). Column 28 (net exports) is blank, so one may assume the meat animal sector is a net importer.[2/] Output worth $18,532 went into inventory addition (column 33). Since this is a livestock sector, a buildup of live animals is indicated, part of which were breeding stock and perhaps better assigned to gross private capital formation (column 35). Information to make this distinction was not available, however. Farm households (column 36), consumed $3,372,000 worth of meat animals. This portion of output did not pass

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1/ Martin, William E., and Harold O. Carter, op. cit.

2/ Sector UC 3 (farm dairy products) and exogenous sectors UC 28 through 37 are the exceptions to this rule. No imports or exports were assigned to these sectors. Table S.39 in Part II of this report lists the value of net imports by sector of origin.

through the market but was valued at the average price of meat animals sold. Other households (column 37) is blank since meat animals and products flow through a processing sector before reaching the consumer. The final column lists the total gross domestic output of the sector ($336,881,000). Other rows have analogous descriptions.

Entries in "flow" Table I-I correspond with components of the basic equation (5a). Specific examples (each from sector 1) are as follows: Gross domestic output ($336,881,000) equals X_1, inputs to meat processing ($314,804,000) equals $x_{1.12}$, production of scrap and by-products ($147,000) equals $Y_{1.1}$, net exports (zero) equals $Y_{1.}^{\circ}$.

The Column Entries

Each column of Table I-I presents a sector's input structure. Using column 2 as an illustration, it is shown that the poultry and egg sector purchased $57,363,000 worth of products from itself (row 2). This includes the value of eggs sold to hatcheries and used for on-farm hatchings, as well as the value of chicks and poults sold to farmers from hatcheries. The poultry sector's purchases of food and feed grains (unprocessed) amounted to $21,919,000 (row 4). Processed feeds, purchased from the grain mill products sector (row 11) are estimated at $107,137,000.

Other industry purchases by the poultry and egg sector include $1,015,000 worth of chemicals and fertilizers (row 16), mainly veterinary supplies; $1,195,000 worth of petroleum products (row 17); $1,713,000 worth of fabricated metals and machinery (row 18), mainly trucks and the farm share of autos; $6,877,000 worth of other manufactured products (row 21), mostly paper products, but also including small amounts of textile products, rubber products, miscellaneous products, and the products of the printing and publishing industries. Natural gas, electricity, and telephone utilities (row 22) were purchased in the amount of $1,641,000. Services purchased amounted to $1,661,000 (row 24) and $5,268,000 (row 26). Nine hundred thirty-seven thousand dollars' worth of by-product feeds were used (row 27). The aggregate trade and transportation margin on the above-mentioned inputs totaled $30,373,000 (row 25). All of these inputs were produced within California. The California poultry industry was a net importer of products also produced by domestic sectors UC 4, 11, 16, 18, and 21, however. The aggregate value of imports of products of these sectors purchased by the poultry industry was $22,593,000 (row 28). Most of this was processed feeds. Sector UC 2 also purchased: $2,222,000 worth of maintenance construction; $4,662,000 worth of state and local government services; $815,000

worth of federal government services (government services are assumed to be equal to taxes, licenses, etc.); and $44,826,000 worth of household services, including wages, salaries, proprietors' profits, depreciation, and interest payments. The last row, gross domestic outlay, is the total value of all inputs ($312,217,000). It is seen to be equal to the gross domestic output of the poultry and egg sector. The outlays of the other sectors in 1954 may be similarly traced by examining their respective columns.

Specific example of correspondence with equation (5a) are as follows: Internal inputs ($57,363,000) equals $x_{2.2}$; inputs from chemicals and fertilizers ($1,015,000) equals $x_{16.2}$; imports ($22,593,000) equals $x_{28.2}^{o}$; by-product inputs equal $x_{27.2}$.

Technical Coefficients

Model I

Table II-I (Appendix A) shows the direct purchases of each sector from every other sector per dollar of output in 1954 for Model I. Since purchases per dollar of output is not a relevant concept for most final demand sectors, columns 27 through 37 are excluded from the table. Exogenous rows 27 through 37 are included, although they are not usually considered to be stable proportions of output over time, to complete the statistical description of 1954 purchases. Certain of these exogenous rows (sectors) are later treated as primary resources. All entries in Table II-I were calculated directly from Table I-I. Entries in endogenous rows 1 through 26 are the a_{ij} of equation (6). For example, domestically grown grains ($14,394,000) purchased by the meat animal and product sector (row 4, column 1 in Table I-I) divided by the gross domestic output of the meat animal sector ($336,881,000 shown in the last column of row 1) equals .042727 dollars (the entry in row 4, column 1 of Table II-I). Entries in other rows (including exogenous rows 28 through 37) were obtained in a completely analogous manner.

Each entry in Table II-I shows the value of goods and services required from the row sector per dollar of output by the column sector. For instance, for each dollar of output produced by the poultry and egg sector (column 2), the following amounts of domestically produced goods were directly required from endogenous sectors (rounding to the nearest tenth of a cent): 18.4 cents internally (row 2); 7.0 cents of unprocessed food and feed grains (row 4); 34.3 cents of grain mill products (row 11); .33 cents of chemicals and fertilizers (row 16); .38 cents of petroleum products (row 17); 0.5 cents of fabricated metals and

machinery (row 18); 2.2 cents of other manufactured products (row 21); 0.5 cents of utilities (row 23); 0.5 cents of selected services (row 24); 9.7 cents of trade and transportation margins (row 25); and 1.7 cents worth of products from the unallocated sector (row 26). In 1954 the inputs per dollar of output to the poultry sector from sectors considered exogenous in the model were 0.3 cents of scrap and by-products (row 27); 7.2 cents of imports into California (row 28); 0.7 cents of maintenance construction (row 29); 1.5 cents of state and local government services (row 31); 0.3 cents of federal government services (row 32); and 14.4 cents from households (row 37). The total of the input column is equal to one dollar (excluding rounding error). Other columns provide similar information for the remaining sectors.

Model III

Table II-III (Appendix A) provides analogous information for Model III, the regional disaggregation of Model I. Row and column numbers are prefaced by an N or an S to indicate the region of production or use. Rows 28 through 37 do not carry the N or S preface. Sector 28 distributes imports from outside of the state. Sectors 29 through 37 do not export--thus the region of origin is implied by the region of use.

Table II-III is interpreted as follows (reading down column S.1). The meat animal and product sector in southern California made net direct purchases from northern California per dollar of southern meat animal output of 2.6 cents of unprocessed grains (row N.4), 12.2 cents of forage crops (row N.9), 0.02 cents of utilities and 0.2 cents of scrap and by-products (row N.27). Sector S.1 made direct purchases per dollar of output from southern California sectors of 0.7 cents of unprocessed grains (row S.4), 13.6 cents of forage crops (row S.9), 0.03 cents of output from the miscellaneous agriculture sector (row S.10), 4.3 cents' worth of grain mill products (row S.11), etc. Direct inputs per dollar of output by the southern California meat animals and product sector from exogenous sectors of the South were 2.3 cents of scrap and by-products (row S.27), 1.1 cents of maintenance construction (row 29), 1.7 cents from state and local governments (row 31), 0.08 cents from the federal government (row 32), and 15.5 cents from households (row 37). Net direct imports from outside of the state per dollar of output were worth 38.4 cents (row 28).

Other columns have similar interpretations. Note that the North has only one direct net import from the South (row S.26, column N.24).

Model I

Table III-I (Appendix A), the matrix of interdependence coefficients for Model I, was computed from Table II-I as developed in equations (8) and (9). Entries are the A_{ij} of equation (10). The unique feature of this matrix is that indirect and circular relationships between sectors, as well as the direct relationships, are summarized. Each coefficient shows the direct and indirect requirements for products of the row sector per dollar of delivery to final demand of products of the column sector. Thus, a dollar's worth of final demand for unprocessed poultry products (sector UC 2) is associated with outputs of California industries amounting to 0.1 cents from meat animals and products (row 1) (reading down column 2 and rounding to one-tenth of a cent); one dollar and 22.5 cents from itself (one dollar for final demand plus 22.5 cents' worth of generated internal flows); 0.1 cents from farm dairy products (row 3); 22.4 cents from food and feed grains (row 4); etc. Very small outputs are generated in the other agricultural sectors. Further down column 2 a one dollar delivery to final demand is associated with 45.0 cents of grain mill products (row 11); 0.4 cents' worth of meat and poultry processing (row 12); and 0.2 cents of processed dairy products (row 13). In row 25, it is seen that direct and indirect requirements of 18.7 cents are generated for trade and transportation margins.

Model III

Table III-III (Appendix A) presents the interdependence matrix for the north-south model. The row and column numbers are prefaced by an N or an S to indicate northern or southern sectors. As in Model I, each coefficient shows the direct and indirect requirements for products of the row sector per dollar of delivery to final demand of products of the column sector. These coefficients correspond to the A_{ij} of equation (20).

For example, a one dollar delivery to final demand of processed dairy products from northern California requires direct and indirect outputs of (reading down Column N.13) 0.2 cents of northern meat animal production (row N.1), 0.06 cents of northern poultry and egg output (row N.2), 55.5 cents of northern farm dairy products (row N.3), etc. Requirements are generated for products of all northern sectors except citrus (row N.8). Entries in column N.13 from row S.1 to S.16 are zero. No direct or indirect requirements for products of these southern California sectors are generated by the delivery to final demand

of northern California processed dairy products. Very small indirect requirements for products of sector S.17 (petroleum), S.21 (other manufacturing), S.23 (utilities), S.25 (trade and transportation), and S.26 (unallocated), are generated, however.[1/]

A one dollar delivery to final demand of products of the southern California dairy products sector requires (reading down column S.13) 0.5 cents of northern farm dairy products (row N.3), 1.8 cents of northern unprocessed grains (row N.4), 5.9 cents of northern forage (row N.9), as well as smaller amounts of products from most other northern sectors (excluding only northern cotton (row N.5) and northern citrus (row N.8)). Direct and indirect requirements are generated for products of all southern California sectors. The largest of these is 53.1 cents of southern California produced farm dairy products (row S.3). Other columns may be interpreted in an identical fashion.

Coefficients do not specify from which region the change in final demand originated. Final demand for the product of a given producing sector may originate either in the North, the South, or outside of California. It is the net change in final demand for products of that particular sector from that particular region that is relevant. In estimating a final demand change, however, the region from which the change originated may be specified. Thus, when (for example) all southern California household purchases expand by 10 percent (e.g., in response to a 10 percent increase in population) the construction of the final demand flow tables[2/] assumes a portion of this demand is for products of the North. Coefficients of Table III-III may then be examined to determine direct and indirect requirements for northern and southern products in response to the increased final demand for northern products resulting from an increase in final demand by southern California households.

V. OUTPUT IMPLICATIONS FOR CALIFORNIA, MODEL I

As indicated previously, this single publication cannot assemble all possible interpretations that can be made from the input-output tables presented in Appendix A. Therefore, the procedure followed in remaining sections of this report is to summarize some of the more important relationships from the basic tables and use aggregations derived therefrom for certain other comparisons.

1/ Requirements recorded in the 26 x 26 submatrix showing northern purchases from the South are indirect requirements only (except for requirements recorded in row S.26, column N.24). Net direct requirements of the North from the South did not occur.

2/ Tables S.51 and S.52 presented in Part II of this report.

Table 1 presents Model I aggregated from 26 to 6 endogenous sectors. This "telescoped view" of the California economy identifies agriculture with two broad sectors--livestock and crops, whereas industry is subdivided into four categories: (1) Agricultural processing industries, (2) manufacturing and mining, (3) services and utilities, and (4) trade and transportation. Table 2 summarizes the distribution of dollar flows shown in Table 1, in percentage terms. The entries in Table 2, reading across, indicate the percent of gross output of the sector named at the left distributed among the sectors named at the top.

For example, the livestock sector depends on interindustry demand (primarily agricultural processing industries) for about 77 percent of its sales; the comparable figure for the crop sector is 54 percent. Accordingly, livestock delivers 22 percent of gross output to final demand (mainly fresh eggs and poultry) and crops deliver 28 percent to net export (primarily fresh fruit and vegetables) and 18 percent to final demand. Although the primary sales outlet for agricultural processing industries is to final demand (63 percent), 28 percent of gross sales are distributed internally (to other processing plants) and to other industries in California.

Note that in the aggregate (see Table 1) California is a deficit producer of livestock and manufactured and mining products. Crops make up the export surplus in agriculture; processed agricultural goods, services and utilities, and trade and transportation form the excess in industry.

Table I-I (Appendix A) shows net exports by individual sector. California is deficit in most sectors relating directly to meat or milk production. Net imports from each of the meat animal, meat and poultry processing, dairy products, food and feed grains, grain mill products, and forage sectors are required. (Small exports of poultry occur although California is deficit in eggs; fluid milk has neither net imports nor net exports). Cotton, fruit, vegetables, and processed fruit and vegetables provide net exports. Apparently, California's comparative advantage lies with high return per acre crops. It is improbable that California has any advantage in feedlot cattle operations due to the large feed grain imports required. Too, as population increases drive land values higher, grain and forage sectors should find it even harder to compete. Meat animal inshipments for immediate slaughter may therefore become an increasingly large percentage of total meat consumption. Implications of these and other

TABLE 1

Interindustry Flows of Goods and Services by Industry of Origin and Destination, California Economy, 1954,[a] Model I

Producing sectors	Purchasing sectors: Livestock	Crops	Agric. processing	Mfg. and mining	Services and utilities	Trade and transport.	Scrap and by-prod.	Net exports	Inventory change	Domestic final demand	Output: Total state output
	1	2	3	4	5	6	7	8	9	10	11
1 Livestock[b]	52,688	--	715,014	21	--	--	45,504	--	20,589	158,825	992,641
2 Crops[c]	224,811	111,896	689,049	9,093	--	--	37,325	543,845	40,165	266,353	1,922,537
3 Ag. processing[d]	170,475	1,742	832,716	46,285	471,167	31,771	39,121	318,258	21,805	3,016,660	4,949,000
4 Mfg. and mining[e]	31,754	263,308	536,755	7,384,209	1,463,631	531,466	106,710	--	-15,577	7,783,012	18,085,268
5 Serv. and utilities[f]	23,636	61,691	183,989	591,936	2,196,083	1,120,953	--	573,846	--	11,484,242	16,236,358
6 Trade and trans.[g]	61,176	102,672	182,880	640,868	626,803	288,407	--	264,277	--	5,985,547	8,152,630
7 Scrap and by-prod.[g]	15,822	288	81,278	124,289	814	--	--	--	372	5,797	228,660
8 Imports[g]	139,219	6,463	317,135	316,782	42,859	65,389	--	--	--	375,737	1,263,584
9 Construction[h]	10,128	18,879	14,132	50,620	867,562	203,156	--	--	--	5,303,841	6,468,318
10 Government[i]	22,630	69,967	181,404	941,189	1,872,386	896,335	--	--	--	5,458,798	9,442,709
11 Households[g]	240,302	1,285,631	1,214,648	7,980,976	8,695,053	5,015,171	--	--	--	8,237,965	32,669,746
Total inputs	992,641	1,922,537	4,949,000	18,085,268	16,236,338	8,152,630	228,660	1,700,226	67,354	48,076,777	

a/ Each entry shows the volume of goods and services in thousands of dollars produced by the row sector and purchased by the column sector.

b/ Includes sectors UC 1 through 3.

c/ Includes sectors UC 4 through 10.

d/ Includes sectors UC 11 through 15.

e/ Includes sectors UC 16 through 22.

f/ Includes sectors UC 23, 24, and 26.

g/ Defined as in the 26-sector model.

h/ Includes sectors UC 31 and 32.

i/ Includes sectors UC 31 and 32.

TABLE 2

Percentage Distributions of Output, 1954

Producing sectors	Percentage of total distribution of output to:				
	Agri-culture	Agri. process-ing	Other indus-try	Net exports	Domestic final demand [a]
Livestock	5	72	b/	0	22
Crops	18	36	b/	28	18
Agr. processing	3	17	11	6	63
Mfg. & mining	2	3	52	0	43
Serv. & utilities	b/	1	24	5	70
Trade & transport.	2	2	19	3	73
Scrap & by-products	7	35	55	0	3
Construction	b/	b/	17	0	82
Government	1	2	39	0	58
Households	5	4	66	0	25

a/ Including scrap and by-products and inventory change.

b/ Less than 0.5 percent.

relationships on the output of interrelated sectors are discussed later when interdependence coefficients are presented.

Net exports of nonagricultural sectors occur in the extractive industries (petroleum and mining), aircraft industry, and service and trade industries. Except for aircraft, California is a net importer of manufactured products. A 10.5 percent cut in aircraft exports alone would make California a net importer in the aggregate (including both agricultural and nonagricultural products).

Direct Dependence Between Sectors

An Aggregate View

Technical coefficients corresponding to the six sector aggregation of Table 1 are presented in Table 3. Table 3 illustrates the direct dependence between major California sectors and will serve also as a comparison with structural coefficients (in the following section) showing both direct and indirect dependence between sectors.

Of the industrial sectors of the California economy, the agricultural processing industries have consistently large direct inputs per dollar of output from all of the endogenous sectors[1/]--14.4 cents from livestock, 13.9 cents from crops, 16.8 cents internally, 10.5 cents from manufacturing and mining (large amounts of tin cans), and 3.7 cents each from services and utilities and trade and transportation. This is true even though the livestock, and manufacturing and mining sectors are large importers, thus reducing their input coefficients (agricultural processing purchases 6.4 cents' worth of imported goods). With operating expenses (not including labor) taking so much of the input dollar, inputs from households (depreciation, labor, interest, profits) are smaller than for all other sectors except livestock. The household input is only 24.5 cents for agricultural processing, while it is 44.1 cents for manufacturing and mining, 53.5 cents for services and utilities, 61.5 cents for trade and transportation, and 66.9 cents for crop production. Households contribute only 24.2 cents out of every input dollar to the livestock sector. One would suspect that the agricultural processing sector, so heavily dependent on all other producing sectors of the economy for direct inputs, would have a large output multiplier effect on the economy if indirect effects were also concerned. This is shown to be true in a following section on interdependence.

1/ Table 3 was developed directly from Table 1 as indicated by equation (6).

TABLE 3

Technical Coefficients, California Economy, 1954,[a] Model I

Producing sectors	Purchasing sectors: Secondary agriculture (livestock)	Primary agriculture (crops)	Agri. processing	Mfg. & mining	Services and utilities	Trade & transport.
	1	2	3	4	5	6
1 Livestock[b]	.0531	--	.1445	--[j]	--	--
2 Crops[c]	.2265	.0582	.1392	.0005	--	--
3 Agr. processing[d]	.1717	.0009	.1683	.0025	.0290	.0039
4 Mfg. & mining[e]	.0320	.1370	.1085	.4083	.0901	.0652
5 Serv. & utilities[f]	.0238	.0321	.0372	.0327	.1353	.1375
6 Trade & trans.[g]	.0606	.0534	.0370	.0354	.0386	.0354
7 Scrap & by-products[g]	.0159	.0002	.0164	.0069	.0001	--
8 Net imports[g]	.1403	.0034	.0641	.0175	.0026	.0080
9 Construction[h]	.0102	.0098	.0029	.0028	.0534	.0249
10 Government[i]	.0228	.0364	.0367	.0520	.1153	.1099
11 Households[g]	.2421	.6687	.2454	.4413	.5355	.6152

a/ Each entry shows the dollars of direct inputs from the row sector to the column sector per dollar of output of the column sector.

b/ Includes sectors UC 1 through 3.

c/ Includes sectors UC 4 through 10.

d/ Includes sectors UC 11 through 15.

e/ Includes sectors UC 16 through 22.

f/ Includes sectors UC 23, 24, and 26.

g/ Defined as in 26 sector model.

h/ Includes sectors UC 29 and 30.

i/ Includes sectors UC 31 and 32.

j/ .000001.

Direct inputs from agriculture into the other industrial sectors are of minor importance relative to their total output. Only 0.05 cents are required per dollar of output of manufacturing and mining from the crop sector. This includes small amounts of cotton, farm forest products, and miscellaneous crops such as broom corn. Wool and mohair from the livestock sector to California industry are negligible. Practically all cotton and wool produced in California is exported for processing. An increase or decrease in California cotton or wool production would have a small direct effect on California industry.[1/]

Dependence of agricultural sectors on the industrial segment of the economy differs widely between crop and livestock sectors. Livestock requires only 11.7 cents from the manufacturing and mining, services and utilities, and trade and transportation sectors, while crops require 22.3 cents from these same sectors per dollar of output. Livestock requires an additional 17.2 cents from agricultural processing, however, while crops require only negligible agricultural processing inputs. Thus, the livestock sectors have the greater requirements for products of all nonagricultural sectors (28.9 cents vs. 32.3 cents) but are not as dependent on manufacturing and service sectors as are the crops sectors.

Within agriculture, inputs of crops to livestock is the important flow. Both crops and livestock use approximately 5 cents per dollar of output internally for further production. Livestock inputs are not required by crops.

Direct and Indirect Dependence Between California Sectors

The direct inputs per unit of output discussed in the last sections show which industry is affected first by a change in output of some other industry. This direct relationship is the usual one thought of when an industry is called an "agricultural furnishing" industry or an "agricultural product using" industry or the popular "agribusiness." But is the primary metals sector which is a heavy supplier of the fabricated metals sector, which is a supplier of agricultural machinery, any less of an "agricultural furnishing" industry because it does not sell directly to agriculture? As will be shown, often the direct effects of an output change by a sector are outweighed by induced indirect effects. That every sector is indirectly dependent on the other is immediately demonstrated by comparing Table II-I with Table III-I. In Table II-I, where direct relationships are shown, only 368 of the total of 676 cells

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1/ Cotton ginning is an "agricultural service" included in the crop aggregate. Cottonseed is a by-product and is thus distributed to manufacturing from the exogenous scrap and by-product sector. Indirect effects from changes of cotton or wool production would undoubtedly to felt through changes in purchasing power of California farmers, however.

in the 26 x 26 matrix are filled. In Table III-I, where combined direct and indirect requirements of all sectors resulting from the delivery to final demand of one dollar of output from each sector is shown, all 676 cells contain coefficients.

An Aggregate View

The matrix of interdependence coefficients for the aggregated six sector California model is presented as Table 4. These coefficients were adjusted[1/] to reflect changes in output rather than final demand and are presented in Table 5. If coefficients from Table 3 are subtracted from corresponding coefficients (excluding those in the diagonal) in Table 5 to obtain only the indirect requirements generated by changes in outputs, a table of ratios of indirect to direct effects may be computed. These ratios are presented as Table 6. Each entry is the proportion that indirect requirements of the column sector for products of the row sector are of the corresponding direct requirements.

For example, a change in output by the livestock sector would generate 9 percent as much indirect output requirements from the crop sector as it would direct requirements. Since direct requirements are 25 cents per dollar of output, even such a small indirect to direct ratio is a potent force.

The indirect to direct requirement ratio is extremely large, (4.52) for requirements of the manufacturing and mining industries generated by an output change of the livestock sector. This is a rather surprising result, since direct manufacturing and mining inputs into the livestock sector are relatively small, and direct livestock inputs into manufacturing and mining are extremely small. The circularity by which this indirect output is generated therefore takes a more devious route. A partial tracing of this route might be as follows: The crop and agricultural processing sectors (in this case prepared feeds) both have large direct inputs into the livestock sector. These two sectors in turn have large direct inputs of manufacturing and mining inputs. Agricultural processing also has large direct inputs of livestock, crops, and internal flows from itself. Each of these sectors would in turn generate manufacturing and mining inputs. Finally, manufacturing and mining has the largest internal flows of any other sector.

Of the 24 indirect to direct ratios listed in Table 6, eight are greater than 1:1--the indirect effects of a sector's output change on a supplying sector

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1/ Refer to the sub-section "Direct versus indirect output changes" in Section III. Adjusted coefficients are obtained by dividing each element in each column by the respective diagonal element of that column.

TABLE 4

Interdependence Coefficients, California Economy, 1954,[a] Model I

	Producing sectors	Purchasing sectors: Secondary agriculture (livestock)	Primary agriculture (crops)	Agri. processing	Mfg. & mining	Services and utilities	Trade & transport.
		1	2	3	4	5	6
1	Secondary agr.[b]	1.0910	.0007	.1902	.0013	.0066	.0018
2	Primary agr.[c]	.2694	1.0628	.2302	.0025	.0081	.0022
3	Agr. processing[d]	.2293	.0046	1.2464	.0084	.0432	.0118
4	Mfg. & mining[e]	.1926	.2640	.3159	1.7111	.1954	.1448
5	Serv. & utilities[f]	.0749	.0610	.0933	.0758	1.1752	.1730
6	Trade & trans.[g]	.1050	.0712	.0880	.0664	.0567	1.0496

a/ Each entry shows the direct and indirect requirements for products of the row sector per dollar of final demand for products of the column sector.

b/ Includes sectors UC 1 through 3.

c/ Includes sectors UC 4 through 10.

d/ Includes sectors UC 11 through 15.

e/ Includes sectors UC 16 through 22.

f/ Includes sectors UC 23, 24, and 26.

g/ Includes sector UC 25.

TABLE 5

Adjusted Interdependence Coefficients, California Economy, 1954,[a] Model I

Producing sectors	Purchasing sectors: Secondary agriculture (livestock)	Primary agriculture (crops)	Agri. processing	Mfg. & mining	Services and utilities	Trade & transport.
	1	2	3	4	5	6
1 Secondary agr.[b]	1.0000	.0007	.1526	.0007	.0056	.0017
2 Primary agr.[c]	.2469	1.0000	.1847	.0014	.0069	.0021
3 Agr. processing[d]	.2102	.0043	1.0000	.0049	.0368	.0112
4 Mfg. & mining[e]	.1765	.2484	.2535	1.0000	.1663	.1379
5 Serv. & utilities[f]	.0686	.0574	.0749	.0443	1.0000	.1648
6 Trade & trans.[g]	.0962	.0670	.0706	.0388	.0483	1.0000

a/ Each entry shows the direct and indirect requirements for products of the row sector per dollar of output of products of the column sector.

b/ Includes sectors UC 1 through 3.

c/ Includes sectors UC 4 through 10.

d/ Includes sectors UC 11 through 15.

e/ Includes sectors UC 16 through 22.

f/ Includes sectors UC 23, 24, and 26.

g/ Includes sector UC 25.

TABLE 6

Ratios of Indirect to Direct Requirements, California Economy, 1954,[a] Model I

	Producing sectors[b]	Purchasing sectors: Secondary agriculture (livestock)	Primary agriculture (crops)	Agri. processing	Mfg. & mining	Serivces and utilities	Trade & transport.
		1	2	3	4	5	6
1	Secondary agr.	[c]	[d]	.06	[d]	[d]	[d]
2	Primary agr.	.09	--	.33	1.80	[d]	[d]
3	Agr. processing	.22	3.78	--	.96	.27	1.87
4	Mfg. & mining	4.52	.81	1.34	--	.85	1.12
5	Servs. & utilities	1.96	.79	1.01	.35	--	.19
6	Trade & transport.	.56	.25	.91	.10	.25	--

[a] Each entry is the proportion that indirect requirements of the column sector for products of the row sector are of the corresponding direct requirements.

[b] Sectors are defined as for Tables 5.5, 5.8, and 5.9.

[c] Ratios are not applicable for the diagonal elements.

[d] Indirect requirements but no direct requirements.

are greater than the direct effects. Of these eight large indirect to direct ratios, five occur in agriculture or agricultural processing. These results emphasize the fact that the interrelationships existing between agriculture and industry may be vastly understated if observations are limited to only direct transactions between these sections.

Agriculture Versus Industry

The general question of farm and nonfarm interdependence may be presented by dividing the economy into three sectors--agriculture, agricultural processing, and other industry. An interdependency matrix for this three sector classification was not computed. Instead, induced direct and indirect requirements resulting from a 10 percent change in 1954 final demand were computed using interdependency coefficients of Table 4 for each of its six sectors. Requirements for products of each of the six sectors by each of the six sectors were then aggregated as the analysis required.1/ The results are presented in Table 7.

A 10 percent change in final demand for products of agriculture and agricultural processing combined2/ induces a 0.5 percent change in other industry output. A similar change in final demand for other industry output induces a 1.14 percent output change in agriculture and agricultural processing combined, or a 0.78 percent output change for agriculture and a 1.34 percent output change in agricultural processing. Thus, industry, which has only negligible direct inputs from agriculture, and relatively small inputs from agricultural processing, has greater effects on agriculture and agricultural processing than these two sectors have on industry. This is despite the fact that (1) agriculture and agricultural processing have large direct inputs from industry per dollar of output and (2) induce large indirect effects in industry per dollar of agricultural final demand. While both direct and indirect effects of industry on agriculture are small per dollar of industry final demand, the large final demand for nonagricultural products causes total effects of industry on agriculture to be large.

1/ Interdependency coefficients may be directly aggregated within columns (see "multiplier" discussion of Section III) but not between columns; thus this indirect approach to aggregation was required. Additional information is gained by this indirect procedure, however. Interdependence between sectors is weighted by final demand for the purchasing sector's output. Thus, the absolute effects on the economy rather than effects per dollar of final demand are obtained (see discussion of equation (11), Section III).

2/ Aggregate final demand for products of both agriculture and agricultural processing is a more relevant concept than final demand for agriculture or agricultural processing only. If final demand for food changes, it will presumably be distributed between fresh foods (agriculture) and processed foods (agricultural processing) in similar proportions to the present distribution.

TABLE 7

Agriculture Versus Industry: Output Effects Resulting from Changes in Final Demand

	1954 output	1954 final demand	Percent change in output resulting from a 10% change in final demand for: Agriculture plus agricultural processing	Other industry	Total
	thousands of dollars		1	2	3
1 Agriculture	2,915,178	1,112,606	a/	0.78	a/
2 Agricultural processing	4,949,000	3,395,844	a/	1.34	a/
3 Agriculture plus Agricultural processing	7,864,178	4,508,450	8.86	1.14	10.0
4 Other industry	42,474,256	26,182,057	0.50	9.50	10.0

a/ Irrelevant combinations.

Note that the sum of the percentage changes in output occurring as a result of a 10 percent change in final demand for both agriculture and for other industry is also 10 percent. While changes in output of (for example) other industry are induced in varying degrees by a 10 percent change in final demand for output of individual sectors, if final demand for each and every sector changed by the same percent, total output for any given sector is changed by that percent also. In other words, if every sector's final demand increased in a fixed proportion, then every input and output in the economy increases proportionally; the new economy is an exact replica of the old one but on a larger scale.

A More Detailed View of the Economy

Interdependence between individual sectors of the 26 sector California model are discussed below. Where the previous section viewed the over-all relationships between agriculture and industry, the following section (1) points out relationships between individual sectors of these two aggregates, (2) develops "multipliers" for each sector of the economy, and (3) ranks sectors in order of relative multiplicative ability. Discussion centers about Table III-I (Appendix A), although certain tables derived from this table are presented in the text.

The Meat Animals Sector.--Internal flows of output generated by a one dollar delivery to final demand are only slightly above one dollar ($1.000296) for the meat animal and product sector. Direct plus indirect requirements are low since no direct internal inputs occurred in this sector.[1/] Because a one dollar change in final demand is, in this case, approximately equivalent to a one dollar change in output, column 1 of Table III-I may be directly compared to column 1 of Table II-I in order to discover the indirect requirements of the meat animal sector.

One and six tenths cents out of total direct and indirect requirements of food and feed grains of 6.0 cents are generated indirectly. A change in output of one dollar by the meat animal sector requires only a directly proportional change in forage output--the indirect requirements are negligible. Very small indirect requirements were generated for products of all other agricultural sectors even though no direct requirements occurred.[2/]

1/ All purchases of stockers and feeders by the meat animal sector were through the import sector.

2/ A 1.9 cent indirect requirement for products of the miscellaneous agriculture sector is shown. Since this sector is an aggregate of many, relatively small, dissimilar enterprises, however, it will be treated only as a balancing sector in the economy and not discussed specifically.

Indirect requirements for goods of the agricultural processing industries generated by output of the meat animal sector are also small. Even for prepared feeds (a component of grain mill products) where direct requirements were substantial, only 0.3 cents of indirect goods are required compared to 4.7 cents of direct. The pattern of indirect requirements for industrial, trade, and service goods is quite different. The ratio of indirect to direct requirements ranges from 0.72 for trade and transportation margins (i.e., indirect output generated was equal to 72 percent of the amount of direct requirements) and 1.56 for utilities, to 6.38 for petroleum and 8.10 for fabricated metals and machinery. Even counting both direct and indirect requirements, however, the individual requirements for products of the nonagricultural sectors are relatively small per dollar of output of meat animals and products. The largest item is 8.2 cents for trade and transportation margins.

The sum of the entire column of coefficients is the total direct and indirect requirements for products of all sectors within the California economy generated by a one dollar delivery to final demand of meat animals and products. This sum, 1.6113, may be termed the meat animal "output multiplier."[1/] For every additional dollar's worth of meat animals delivered to final demand (other demands remaining constant), 1.6113 dollars' worth of requirements for additional output is generated within the California economy.[2/] (Output Multipliers for other sectors are listed in Table 8.)

The Poultry Sector.--Large internal flows occur in the poultry sector; therefore, column 2 of Table III-I must be divided by its diagonal element, 1.225396, where a comparison with Table II-I to discover the magnitudes of direct versus indirect requirements is desired. Direct and indirect requirements for food and feed grain output were 22.4 cents for every dollar's worth of poultry products delivered to final demand. Converted to requirements per dollar of output it amounts to 18.3 cents--7.0 cents direct and 11.3 cents indirect. The poultry sector generates larger indirect requirements for unprocessed grains than the meat sector does since it uses a larger proportion of prepared feeds--which in turn generates additional requirements for unprocessed grains. Indirect

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1/ Multipliers are defined in detail in the theoretical discussion of Section III. Recall that the multipliers of this study are "output requirement" multipliers, and do not imply the income effects of the "Keynesian type" multipliers.

2/ Since all meat except that small amount consumed by farm households flows through the meat and poultry processing sector before being delivered to final demand, the meat animal multipliers have no real significance in answer to the effects on output in response to a change in consumer demand for meat. Inventories of live animals may change, however, either voluntarily or involuntarily, and the multipliers will operate on this portion of final demand as well as on a change in consumer demand.

TABLE 8

Output Multiplier Effects of a One Dollar Change in Final Demand for Products of California Industries, Model I

Sector number	Sector	Model I	
		Multiplier[a]	Rank[b]
		1	2
1	Meat animals and products	1.6113	11
2	Poultry and eggs	2.3887	1
3	Farm dairy products	1.7021	8
4	Grains	1.4539	16
5	Cotton	1.3214	25
6	Vegetables	1.2760	26
7	Fruit (excluding citrus) and nuts	1.4112	17
8	Citrus	1.3276	23
9	Forage	1.3691	19
10	Miscellaneous agriculture	1.3819	18
11	Grain mill products	1.8283	4
12	Meat and poultry products	1.8097	6
13	Dairy products	2.2315	2
14	Canning, preserving, freezing	2.0087	3
15	Miscellaneous agricultural proc.	1.8116	5
16	Chemicals and fertilizers	1.6858	9
17	Petroleum products	1.8071	7
18	Fabricated metals and machinery	1.6119	10
19	Aircraft and parts	1.4803	15
20	Primary metals	1.5220	13
21	Other manufacturing	1.4847	14
22	Mining	1.3481	20
23	Utilities	1.3418	21
24	Selected services	1.5601	12
25	Trade and transportation	1.3226	24
26	Unallocated services	1.3291	22

a/ Total change in gross output within the California economy induced by a change in delivery of one dollar to final demand by the sector listed.

b/ Multipliers ranked in order from highest to lowest.

requirements for grain mill products, while substantial, are not as large relative to direct requirements as they are for unprocessed grains. A major circular effect, the requirements of the processing sector for farm grains, is not present.

Although direct inputs to the poultry sector are approximately the same per dollar of output as for the meat animal sector for the remaining industries, the interdependence coefficients are larger in every case. Where the direct inputs are somewhat larger, as in trade and transportation (more margins on purchased feed) and other manufacturing (largely paper cartons), the absolute difference in interdependence coefficients is quite large--from "other manufacturing" it is 1.2 cents versus 6.3 cents, while from trade and transportation it is 8.2 cents versus 18.7 cents. The increase in size of the interdependence coefficients over the corresponding technical coefficient is not a simple function of the size of the direct coefficient, however. The trade and transportation and other manufacturing interdependence coefficients are approximately double the technical coefficients. For the other sectors, where the initial direct inputs are small, the interdependence coefficients are typically three to six times the size of the technical coefficient. The largest increase among the cells where no direct inputs occurred originally was for the miscellaneous agricultural processing sector (UC 15). An increase in demand for one dollar's worth of unprocessed poultry requires an increase in output of UC 15 of 2.0 cents.

Summing all interdependence coefficients in the poultry column and comparing this output multiplier with those of the other sectors, it is found that the poultry sector has the largest output multiplier effect of any California sector. The reason is that the majority of the poultry industry's inputs are goods purchased from the endogenous sectors (mostly processed feeds) as compared to the relatively larger amounts of labor and land inputs that are used in agricultural sectors like fruits and vegetables. Also, large amounts of labor and capital inputs are used in nonagricultural sectors. Moreover, this relatively high output multiplier is apparent even though two of the poultry sector's main suppliers--food and feed grains, and grain mill products--are net importing sectors. Whenever inputs must be imported, the multiplier effect of the using sector on the domestic economy is dampened.

Farm Dairy Products.--The other livestock sector--farm dairy products--has direct inputs similar to those of the meat animal sector and thus has interdependence coefficients of the same general magnitude. The main differences were in the relative proportions of unprocessed and processed grains fed and in the greater machinery input to dairy. The dairy sector fed relatively more

prepared feeds than did the meat animal sector. As a consequence, direct and indirect requirements for grain mill products (UC 11) are 9.9 cents per dollar of final demand for dairy products but only 5.0 cents per dollar of final demand for meat animals, yet total requirements from the food and feed grain sector (UC 4) are still 5.4 cents per dollar of final demand for output of the dairy sector and only 6.0 cents per dollar of final demand of the meat animal sector. The dairy sector thus has a slightly higher output multiplier (1.7021 versus 1.6113).[1/]

The Crop Sectors.--The crop sectors all have smaller output multipliers than the livestock sectors (and most of the nonagricultural sectors) even though the direct inputs from the nonagricultural sectors (tractors, machinery, gasoline, spray, etc.) are in most cases larger than for the livestock sectors. Direct inputs from other crop sectors or the livestock sectors are absent.[2/] Sectors with large output multiplier effects on the economy have direct inputs from both major sectors of the model--agriculture and industry. In consequence, while a few individual interdependence coefficients of the crop sectors are large, the total multiplier effect of any crop sector on the entire California economy is small. (Output multipliers range from 1.4539 for grains to 1.2760 for vegetables).

The largest interdependence coefficients of each crop sector are as follows: a one dollar change in final demand for unprocessed grain[3/] generates 7.1 cents of fabricated metals and machinery, and 9.8 cents' worth of trade and transportation margins; a one dollar change in final demand for cotton[4/] generates 4.2 cents of chemicals and fertilizers, and 5.8 cents of margins; a dollar change in final demand for vegetables (fresh) generates 5.6 cents of other manufactured products and 5.8 cents of margins; a dollar change in final demand for

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1/ A note of caution must again be injected on the significance of the multipliers where no real final demand exists for that sector. While the meat animal sector has inventory changes in lieu of sales to final demand, the construction of the dairy sector makes this concept difficult to accept. The value of an inventory addition of dairy animals is tied in closely with their value as meat, which is a by-product and thus exogenous to the system. The more relevant multipliers are those for the meat and poultry processing sector and the dairy products sector. In contrast, a large part of the output of the poultry sector is distributed directly to final demand (eggs and unprocessed poultry), thus no conceptual difficulties are involved.

2/ A few direct internal inputs are shown. Direct internal inputs are not shown for sectors UC 7 and 9 and the internal inputs for UC 6 and 8 are relatively small. Due to the manner in which data are published, these inputs, vegetable seeds, legume and grass seed, and nursery products, were included as components of UC 10, miscellaneous agriculture, and distributed from that sector.

3/ Normally, final demand for unprocessed grain does not exist. Our government storage programs create such a demand, however. This is reflected as inventory change in the model.

4/ Almost all California cotton is exported before processing. Cotton thus has a final demand as far as California is concerned.

fruit and nuts (fresh) generates 5.9 cents of fabricated metals and machinery, and 7.0 cents of margins; a dollar change in final demand for citrus (fresh) generates 6.3 cents of other manufactured products, and 6.4 cents of trade and transportation margins. A one dollar change in final demand for forage has no significance except for an inventory change. The internal flows are so small, however, that the interdependence coefficients closely approximate the requirements for a one dollar change in output. Thus, a one dollar change in forage output generates 7.1 cents of fabricated metals and machinery, and 7.8 cents of trade and transportation margins.

Trade and transportation receives the largest effects in every case. The effects of final demand for grains is extraordinarily high, however. With the exception of the grain sector itself, the trade and transportation sector appears to be the major beneficiary of the government grain price support program.

Agricultural Processing Sectors.--As a group, the agricultural processing sectors contain the largest multipliers of the model. Each sector is directly related to both agriculture and industry, thus forming a strong base for a chain of interdependence. Processing multipliers range from 2.2315 for dairy products to 1.8283 for meat processing. Only the farm poultry and eggs output multiplier is higher (2.3887). Individual requirement coefficients of particular interest are noted in the following section.

Indirect requirements generated by one dollar of final demand for processed meat and poultry products are particularly large. Total requirements of 3.4 cents of food and feed grains, 8.6 cents of forage crops, and 4.5 cents of grain mill products are implied. Since direct requirements of food and feed grains and forage are zero, these requirements are all indirect. A small amount (.02 cents) of direct requirements from the grain mill products sector is shown. This quantity is not necessarily composed of grain products but may include transfers-in of meat and poultry products produced by the grain mill sector.[1/]

The dairy products sector also generates indirect livestock feed requirements. A one dollar change in final demand for processed dairy products (including fluid milk) generates a change in direct and indirect requirements of 3.0 cents for unprocessed grains, 5.6 cents for processed grains, and 12.8 cents for forage. After adjusting these coefficients to generated output per unit of

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1/ Since most sectors (other than the agricultural sectors) were defined on an establishment basis, the value of total output may include the value of secondary products which are primary to another sector--for example, livestock slaughtered in an establishment primarily producing grain mill products. Such products must be transferred to their primary industry in order that the components of final demand may be analyzed. Such flows are called transfers-in for the receiving sector and transfers-out for the producing sector.

output, they are 2.7 cents, 5.1 cents, and 11.7 cents, respectively. All are indirect requirements, except for small transfers-in from the grain mill sector. Comparing these requirements with those generated by the meat and poultry processing sector indicates that the meat processing sector generates more requirements for unprocessed grain, whereas the dairy products sector generates more requirements for processed grain and forage.

Direct and indirect requirements for raw milk per dollar of final demand for dairy products is the largest interdependence coefficient of the entire model (54.5 cents). Two reasons may be listed for this phenomenon: (1) direct inputs of raw milk per dollar of processed milk are also large and (2) all fluid milk is produced locally.

Nonagricultural Sectors.--Of the sectors of the California economy that are neither agriculture nor agricultural processing, the petroleum sector has the largest output multiplier (1.8071); second largest is the chemical and fertilizer sector (1.6858). Fabricated metals and machinery is third with an output multiplier of 1.6119. Other sectors and their output multipliers (listed in descending order) are selected services (1.5601), primary metals (1.5220), other manufacturing (1.4847), aircraft and parts (1.4803), mining (1.3481), utilities (1.3418), unallocated services (1.3291), and trade and transportation (1.3226).

While effects on individual sectors on other sectors vary depending on which sector is increasing output, trade and transportation always is among the top three beneficiaries. Direct requirements from this sector are always large, and indirect requirements vary from one third to three fourths of direct requirements.

The aircraft and parts sector has a relatively small multiplier effect (1.4803). One might therefore conclude that the impact on the California economy would be greater if the California allocation for defense spending were diverted to purchases from the food processing industries. To so conclude without further inquiry, however, would disregard effects on wages, income, and capital investment as well as the size of the possible diversion. It is true, however, that an increase in government spending on processed agricultural goods (keeping spending on aircraft constant and assuming income effects did not alter final demand for other sectors) would have a greater effect on California's total gross domestic output than if a similar amount were spent on aircraft (again with all other variables remaining constant). But it is the multiplier weighted by the size of the change in final demand that is of ultimate importance. Similar sized changes in final demand for aircraft and processed foods may not be likely. Such comparisons are made in the following section.

Weighted Output Multiplier Comparisons

Output multipliers for each sector listed in Table 8, have been weighted with 10 percent of their respective final demands and are shown and ranked[1/] in Table 9. The ratio of each weighted output multipliers to gross output of all private business sectors is also presented in Table 9. Total output of all private business sectors of the economy was $56,806,752,000 in 1954.[2/]

The five agricultural processing sectors and the poultry sector have the top six unweighted multipliers. When weighted with 10 percent of their corresponding final demands, however, the relative importance of these sectors drops considerably. Poultry falls from first to thirteenth, dairy products from second to eleventh, canning, preserving, and freezing from third to seventh, grain mill products from fourth to nineteenth, miscellaneous agricultural processing from fifth to eighth, and meat and poultry products from sixth to ninth.

Canning, preserving, and freezing has the largest absolute effect (weighted output multipliers) of the agricultural sectors with induced requirements of $227,737,000. This is only one fifth as large as requirements generated by final demand for unallocated services (services of various types including medical and education) ($1,065,528,000). Unallocated services ranked only 22nd. Selected services (repairs, business and personal services, amusements, etc.) ranked twelfth of the unweighted output multipliers but is fourth when weighted by final demand.

A 10 percent change in final demand for aircraft, California's largest manufacturing industry, induces a 1.1 percent change in total state industry output. A final demand change in this industry (keeping all other final demands constant) has particular relevance since the federal government is by far the largest purchaser of aircraft. Purchases may be increased or decreased independently of the surrounding economic climate in response to defense needs of the United States. A 10 percent change in final demand ($412,427,000) implies a $610,516,000 change in output for California.

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1/ A 10 percent change in final demand was selected arbitrarily within the realm of possible short-run final demand changes that may be handled within the framework of a static input-output model. The change may be considered either positive or negative.

2/ Business output is here defined as the value of goods and services (gross domestic output) produced by private business sectors of the economy (UC sectors 1 through 26, 29, and 30). Scrap and by-products is excluded since it is merely a "dummy" sector. The value of scrap and by-products is included in output of the individual producing sectors. Household "output" is really labor income and profits--it is considered later in the study. Government "outputs" are measured by taxes paid. They may have no relation to government activity within this particular state. Imports, of course, are outputs of non-California areas.

Weighted Output Multipliers for California Industries, Model I

Sector number	Sector	1954 final demand[a]	Weighted output multipliers[b]	Ratio of weighted output multiplier to total industry output[c]	Rank of weighted output multiplier[d]	Rank of unweighted output multiplier[e]
		$1,000				
		1	2	3	4	5
1	Meat animals and products	22,051	3,553	0.006	25	11
2	Poultry and eggs	189,310	45,220	0.080	13	1
3	Farm dairy products	57,397	9,769	0.017	23	8
4	Grains	26,369	3,834	0.007	24	16
5	Cotton	282,128	37,280	0.066	16	25
6	Vegetables	319,906	40,820	0.072	15	26
7	Fruit (excluding citrus) and nuts	86,260	12,173	0.021	21	17
8	Citrus	123,575	16,406	0.029	20	23
9	Forage	- 2,020	- 277	0.000	26	19
10	Miscellaneous agriculture	79,812	11,029	0.019	22	18
11	Grain mill products	117,956	21,565	0.038	19	4
12	Meat and poultry processing	829,495	150,114	0.264	9	6
13	Dairy products	435,277	97,132	0.171	11	2
14	Canning, preserving, freezing	1,133,755	227,737	0.401	7	3
15	Miscellaneous agricultural processing	1,041,938	188,757	0.332	8	5
16	Chemicals and fertilizers	296,463	49,978	0.088	12	9
17	Petroleum products	678,636	122,636	0.216	10	7
18	Fabricated metals and machinery	2,114,047	340,763	0.600	6	10
19	Aircraft and parts	4,124,272	610,516	1.075	3	15
20	Primary metals	176,980	26,936	0.047	18	13
21	Other manufacturing	2,353,155	349,373	0.615	5	14
22	Mining	235,521	31,750	0.056	17	20
23	Utilities	312,950	41,992	0.074	14	21
24	Selected services	3,807,074	593,941	1.046	4	12
25	Trade and transportation	6,249,824	826,602	1.455	2	24
26	Unallocated services	8,016,910	1,065,528	1.876	1	22

a/ Sum of columns 27 through 37 in Table 1-1 (Appendix A).

b/ Output multipliers (from Table 8) for each sector are multiplied by an amount equal to 10 percent of the 1954 final demand shown in column 1. For example, the weighted output multiplier for meat and poultry processing (sector 12) is $150,114 [82,950 (10 percent of column 1) x 1.8097 (Table 8) = 150,114].

c/ Column 2 ÷ $56,306,752,000 (total output of all private business sectors).

d/ Ranking from highest to lowest for column 2.

e/ See Table 8 for output multipliers.

Further inquiry into the relative merits of aircraft versus agricultural spending may now be made. Agricultural processing industries, it was noted in Table 8, all have higher output multipliers than does the aircraft industry. Final demand for all processed agricultural goods ($3,558,421,000)1/ is 86 percent as large as final demand for aircraft. The absolute effect of a 10 percent change in final demand for processed agricultural goods is $685,305,000, while the effect of a similar change for aircraft is $610,516,000. The total industry output effect on California would indeed be larger if consumer spending on processed agricultural goods changed by 10 percent than if government spending on aircraft changed by the same percentage. In addition, $56,585,000 less of a change in processed agricultural spending would be necessary.2/

Output effects of agriculture compare even more favorably if final demand for those sectors producing fresh products for final demand are included (poultry, cotton, vegetables, fruit and nuts, citrus, and miscellaneous agriculture). A 10 percent change in total agricultural final demand implies a $848,233,000 change in total state output. Only $51,514,000 more than the $412,427,000 change in aircraft spending is implied to gain $237,717,000 in total California output.

Multiplier Dampening

All multipliers were computed under the assumption of fixed input-output (supply) relationships. As pointed out previously, this procedure was selected to illustrate and analyze prevailing sector interrelationships rather than to make detailed projections over time. The underlying assumption of each multiplier is that the structure of the economy does not change markedly as final demand changes. That is, the magnitude of each direct input per unit of output remains the same after the change in final demand as it was before.

The limitations of this assumption are magnified in a regional model where large imports are possible. In reality, the relationship between domestic inputs and imported inputs per unit of output may change rapidly. If the shift is toward a greater percentage of imports, the multiplicative effects of the

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1/ The sum of agricultural processing final demands in Table 9 ($3,558,421,000) differs from the figure listed in Table 1 ($3,395,844,000) because of aggregation problems. The difference is in the allocation of net imports. Final demand from Table 9 was obtained by summing demands after net imports had been allocated to each individual processing sector. Final demand in Table 1 was obtained after net imports had been allocated to the aggregate processing industry. See the supplement for a discussion of aggregation problems involved.

2/ Again, recall that only output changes are included in the analysis. Effects on wages, income, and capital investments are not considered.

change in final demand may be dampened. Requirements for output will "escape" to industries outside of the California economy.

The agricultural processing sectors provide particularly good examples of this possibility. Final demand for grain mill products, for example, are satisfied by both domestic production and net imports. Domestic production requires net imports of (among other things) unprocessed grains. Implicit in the grain mill output multiplier is the assumption that these and other import percentages will not change as more grain mill products are delivered to California final demand. It is highly probable, however, that California grains, grown mostly in dryland farming areas for a relatively low return per acre, are near economic capacity. That is, if more grain was demanded in California it may be imported rather than grown domestically. The actual output multiplier effect of a positive change in final demand for grain mill products may then be somewhat smaller than shown (1.8283). Similar situations may be observed in other industries.

VI. OUTPUT IMPLICATIONS FOR NORTHERN AND SOUTHERN CALIFORNIA, MODEL III

The Flow of Goods and Services

Flows, classified by sector of origin and sector of consumption for each California region are not presented. However, this portion of the flow table may be reconstructed by multiplying technical coefficients of Table II-III times their corresponding gross domestic outputs.[1/]

In general, inputs were divided between California regions in proportion to the percent of regional output of the purchasing sector. (Details and exceptions are given in Part II of this report.) Percents of total California output by region and sector are presented in Table 10.

While only 29 percent of the state's land area is located in the South, 57 percent of the population dwells there. Moreover, the South produced 30 percent of California agriculture by value in 1954 as well as 60 percent of California's nonagricultural output.

1/ If $a_{ij} = \frac{x_{ij}}{X_j}$ then $x_{ij} = a_{ij}X_j$ (see equation 6); gross domestic output (X_j) for each sector of Model III is given in Part II of this report. Final demands for products of northern and southern California in 1954 are also presented in Part II.

TABLE 10

Percent of Total California Output by Region
and Sector of Origin, 1954

Sector	Percent of total California output produced in the: North	South
UC 1 Meat animals and products	67.59	32.41
UC 2 Poultry and eggs	56.57	43.43
UC 3 Farm dairy products	59.33	40.67
UC 4 Grains	92.35	7.65
UC 5 Cotton	88.38	11.62
UC 6 Vegetables	69.44	30.56
UC 7 Fruit (excluding citrus) and nuts	92.39	7.61
UC 8 Citrus	19.05	80.95
UC 9 Forage	81.54	18.46
UC 10 Misc. agriculture	54.27	45.73
UC 11 Grain mill products	54.70	45.30
UC 12 Meat processing	45.12	54.88
UC 13 Dairy products	59.05	40.95
UC 14 Canning, preserving, freezing	74.10	25.90
UC 15 Misc. agr. processing	54.78	45.24
UC 16 Chemicals and fertilizer	46.21	53.79
UC 17 Petroleum	47.25	52.75
UC 18 Fabricated metals & machinery	32.72	67.28
UC 19 Aircraft	3.34	96.66
UC 20 Primary metals	39.01	60.99
UC 21 Other manufacturing	40.12	59.88
UC 22 Mining	51.90	48.10
UC 23 Utilities	48.32	51.68
UC 24 Selected services	38.43	61.57
UC 25 Trade and transportation	44.15	55.85
UC 26 Unallocated services	43.51	56.49
UC 27 Scrap and by-products	52.33	47.67
UC 29 Maint. construction	44.18	55.82
UC 30 New construction	38.78	61.22
UC 31 Local government	44.29	55.71
UC 32 Federal government	42.86	57.14
UC 37 Households	41.45	58.55
All sectors combined	41.73	58.27

Direct net flows from one region to the other are small. Except for the single net flow of motion picture production from South to North, net flows of products travel exclusively in a southern direction. With one exception, all North to South net flows are agricultural products. Northern sales in the South comprise the following percentages of northern sectors' outputs: 14.1 percent of poultry, 24.8 percent of grain, 3.0 per cent of fruit and nuts, 20.6 percent of dairy products, 0.1 percent of miscellaneous agricultural processing, 5.1 percent of utilities, 9.8 percent of scrap and by-products (including agricultural by-products). Thus, the South provides an outlet for a considerable proportion of the North's agricultural production; hence, final demand increases in the South have much greater impact on northern output than the converse situation.

There is somewhat less direct dependence between the North and southern final demand than between the North and southern producing sectors. For this reason, indirect dependence between regions is much larger than one might estimate where flows between producing sectors of the economy are excluded.

It must be recognized that the timing of product flows is not considered by the model. For example, the South produces adequate fresh vegetables to completely supply its population if production were distributed evenly throughout the year; but agricultural commodities are produced at different times in different regions. Therefore, the gross flow of agricultural commodities such as fresh vegetables may be large between the two regions even though the net value of such flows is zero.

Seasonality of production is not as important in nonagricultural industries. Zero net flows between regions are thus a better indication of direct economic independency for manufactured products than for agriculture. This is not to suggest that net flows would not be revealed by a lower level of sector aggregation. Nevertheless, the absence of net flows in all but three of the 16 nonagricultural sectors indicates little net direct dependence between regions is present.

Direct Dependence Between Sectors and Regions

Differences Between Regional Technical Coefficients

With certain exceptions, total direct inputs per dollar of output for corresponding industries were assumed identical in the two regions. Exceptions to this rule are discussed in detail in Part II of this study. The two

submatrices on the diagonal of Table II-III showing north-into-north, and south-into-south direct inputs per dollar of output differ widely from each other and from the technical coefficient matrix of Model I (Table II-I) for two reasons, however. (1) Corresponding sectors are composed of different proportions of industries. For example, the forage sector (UC 9) is composed of 73.12 percent hay and 26.88 percent pasture in Model I. But the northern California forage sector is composed of 69.86 percent hay and 30.14 percent pasture, while the southern California forage sector is 87.51 percent hay and only 12.49 percent pasture. Different input coefficients result when these individual industries are aggregated into a single sector. (2) Technical coefficients may differ between California and its two regions since inputs of each commodity originated from not more than two sectors in Model I (either domestically produced or imported from out-of-state), while each commodity may originate from three sectors in Model III (within the region, from the other California region, or from outside the state). The technical coefficients do not show total inputs of a particular commodity to a particular sector, but rather the inputs of that commodity to that sector from a particular region.

Implications for Future Direct Regional Dependence

Net direct inputs between regions flow only from North to South in California. The majority of these direct input flows are either processed or unprocessed agricultural products. If, as appears likely, a larger proportion of total California agricultural production occurs in the North in future years,[1/] direct dependence between the North and southern agricultural sectors will be further reduced. The chain of direct dependence now formed by inputs into southern agricultural processing sectors would probably also be reduced. As agriculture shifts northward, agricultural processing will shift northward, too.

This is not to imply that southern California would be any less directly dependent on agricultural products of the North. On the contrary, it could become even more dependent. But the chain of dependence would be mostly from northern processing sectors directly to southern final demand.

Interdependence Between Sectors and Regions

Northern Requirements from the South

The net direct dependence of the North on products of the South is zero,

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1/ Urbanization in the southern areas coupled with higher yields in the northern areas are mentioned as motivating forces in this projected shift. Dean, G. W., and C. O. McCorkle, Jr., Projections Relating to California Agriculture in 1975, University of California, Giannini Foundation Mimeo Rept. No. 234, July 1960.

except for products of the motion picture industry. Generated indirect requirements of the North for southern products due to a one dollar delivery of northern products to final demand do occur, but their magnitudes are too small to be of individual interest. However, out of the 676 possible net flows from South to North (see Table III-III, Appendix A) 162 show indirect requirements (to the sixth decimal place or greater) while only one showed direct effects. These indirect requirements are mostly for products of the southern petroleum, other manufacturing, utilities, selected services, trade and transportation, and unallocated services sectors.

The northern sector with the largest output multiplier effect on the South is selected services. A one dollar delivery to final demand of northern selected services requires direct and indirect requirements of 0.4 cents to be produced by the southern California economy. Multiplier effects of final demand for products of other northern sectors on the southern economy are listed in column 3 of Table 11.

Southern Requirements from the North

Direct requirements of northern produced goods by the South are substantial in only four southern sectors, although small requirements from the North are necessary for all. Grain mill products require 18.9 cents,[1/] meat animals require 14.8 cents, farm dairy products require 12.1 cents, and poultry requires 7.6 cents. Direct requirements are above 1 cent in only two other sectors (unprocessed grains and meat processing).

This amount of direct dependence is large enough to produce indirect dependence of considerable magnitude. The delivery of one dollar of southern grain mill products to final demand induces 30.2 cents' worth of production in the North. Two-thirds of this amount is for unprocessed grains, most of which is direct requirements. Nine and eight-tenths cents are for products of other industries including chemicals and fertilizers (1.2 cents), fabricated metals and machinery (1.5 cents), and trade and transportation (2.0 cents), none of which furnished any direct requirements.

One dollar of final demand for the southern meat animal sector is associated with 22.1 cents' worth of northern products (Table 12).[2/] The largest of these requirements are for unprocessed grains (3.6 cents), forage (12.3 cents),

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1/ Requirements for scrap and by-products are neglected since they do not enter into the interdependency solution.

2/ Since meat animals are not delivered directly from the producing sector to the consumer in this model, a change in final demand denotes an inventory change.

TABLE 11

Output Multiplier Effects of a One Dollar Change in Final Demand for Products of Northern California Industry, Model III

Sector making delivery to final demand	Multiplier effect on the North[a]	Multipliers ranked as to effects on the North[b]	Multiplier effect on the South[c]	Total multiplier for California[d]	Multipliers ranked as to effects on California[e]
	1	2	3	4	5
N. 1	1.640158	10	.000043	1.640201	18
N. 2	2.529306	1	.000075	2.529381	1
N. 3	1.757842	8	.000049	1.757891	11
N. 4	1.484954	16	.000091	1.485045	30
N. 5	1.338498	22	.000040	1.338538	41
N. 6	1.275956	26	.000039	1.275995	51
N. 7	1.420989	18	.000110	1.421099	34
N. 8	1.318921	25	.000064	1.318985	46
N. 9	1.382022	19	.000084	1.382106	37
N. 10	1.454762	17	.000108	1.454870	33
N. 11	1.945933	6	.000059	1.945992	9
N. 12	2.094674	3	.000038	2.094712	5
N. 13	2.307768	2	.000062	2.307830	2
N. 14	2.020236	4	.000073	2.020309	6
N. 15	1.970577	5	.000066	1.970643	8
N. 16	1.746045	9	.000029	1.746074	12
N. 17	1.912055	7	.000029	1.912084	10
N. 18	1.630958	11	.000024	1.630982	19
N. 19	1.494944	14	.000023	1.494967	28
N. 20	1.617636	12	.000025	1.617661	20
N. 21	1.492045	15	.000040	1.492085	29
N. 22	1.355933	21	.000103	1.356036	39
N. 23	1.369742	20	.000027	1.369769	38
N. 24	1.578170	13	.003650	1.581820	25
N. 25	1.326578	24	.000100	1.326678	44
N. 26	1.328515	23	.000042	1.328557	43

a/ The total value of goods of northern California producing sectors associated with a one dollar delivery to final demand of goods from the northern California sector listed on the left.

b/ Multipliers of column 1 ranked in order of decreasing magnitude.

c/ The value of goods of southern California producing sectors associated with a one dollar delivery to final demand of goods from the northern California sector listed on the left.

d/ Column 1 plus column 3.

e/ Multipliers of column 4, Table 11, and column 5, Table 12, ranked in order of decreasing magnitude.

TABLE 12

Output Multiplier Effects of a One Dollar Change in Final Demand for Products of Southern California Industry, Model III

Sector making delivery to final demand	Multiplier effect on the South[a]	Multipliers ranked as to effects on the South[b]	Multiplier effect on the North[c]	Multipliers ranked as to effects on the North[d]	Total multiplier for California[e]	Multipliers ranked as to effects on California[f]
	1	2	3	4	5	6
S. 1	1.360705	18	.221232	3	1.581937	24
S. 2	2.011532	1	.284858	2	2.296390	3
S. 3	1.448825	13	.196363	4	1.645188	17
S. 4	1.419767	15	.038604	7	1.458371	32
S. 5	1.322938	21	.001708	20	1.324646	45
S. 6	1.266512	26	.000961	26	1.267473	52
S. 7	1.412929	16	.001856	17	1.414785	35
S. 8	1.317053	22	.001229	25	1.318282	47
S. 9	1.400493	17	.001335	21	1.401828	36
S. 10	1.342847	19	.010455	11	1.353302	40
S. 11	1.439642	14	.301543	1	1.741185	13
S. 12	1.500725	11	.083707	6	1.584432	23
S. 13	2.043688	2	.124977	5	2.168665	4
S. 14	1.989324	3	.021072	9	2.010396	7
S. 15	1.672092	6	.033417	8	1.705509	15
S. 16	1.689816	5	.006036	13	1.695852	16
S. 17	1.718329	4	.001183	25	1.719512	14
S. 18	1.585598	8	.001238	23	1.586836	22
S. 19	1.470961	12	.001313	22	1.472274	31
S. 20	1.607188	7	.001791	19	1.608979	21
S. 21	1.529285	9	.001851	18	1.531136	27
S. 22	1.332794	20	.003268	15	1.336062	42
S. 23	1.309450	25	.008397	12	1.317847	48
S. 24	1.52678	10	.010874	10	1.537642	26
S. 25	1.314168	23	.002555	16	1.316723	49
S. 26	1.310924	24	.004551	14	1.315475	50

a/ The total value of goods of southern California producing sectors associated with a one dollar delivery to final demand of goods from the southern California sectors listed on the left.

b/ Multipliers of column 1 ranked in order of decreasing magnitude.

c/ The value of goods of northern California producing sectors associated with a one dollar delivery to final demand of goods from the southern California sectors listed on the left.

d/ Multipliers of column 3 ranked in order of decreasing magnitude.

e/ Column 1 plus column 3.

f/ Multipliers of column 4, Table 11, and column 5, Table 12, ranked in order of decreasing magnitude.

fabricated metals and machinery (1.1 cents), and trade and transportation (1.3 cents). Although no other northern sector contributes over 1 cent to the southern meat animal sector, small indirect inputs from all other sectors except cotton and citrus amount to 3.8 cents.

The southern meat animal sector ranks second in the size of direct inputs required from the North but third in the size of both direct and indirect requirements per dollar of final demand. The southern poultry sector ranks fourth in direct requirements from the North (7.6 cents) but is second in direct and indirect requirements (28.5 cents). Indirect requirements per dollar of output are 16.5 cents compared to indirect requirement per dollar of output for southern meat animals and grain mill products of 7.3 cents and 9.4 cents, respectively.

The southern farm dairy products sector is fourth in direct and indirect requirements from the North. Nineteen and six-tenths cents are required, 14.1 cents of which are forage and feed grains, but including small requirements from most other northern sectors.

Other southern sectors with large direct and indirect effects per dollar of final demand in the North (in order of magnitude of their output multipliers) are dairy products (12.5 cents), meat processing (8.4 cents), food and feed grains (3.9 cents), miscellaneous agricultural processing (3.3 cents), and canning, preserving, and freezing (2.1 cents). Although these multiplier effects are not of the magnitudes of the grain mill, meat animal, farm dairy products, or poultry sectors, relative increases in size of requirements from direct requirements per unit of output to direct and indirect requirements per unit of output are more spectacular. Dairy products have direct inputs of only 0.8 cents. Indirect inputs per dollar of output are 10.9 cents. Direct inputs of meat processing are 1.0 cent, while indirect inputs are 7.0 cents. Food and feed grains have a smaller direct to indirect ratio--requirements increased from 2.5 cents to 3.8 cents per dollar of output. Miscellaneous agricultural processing and canning, preserving, and freezing increased from 0.5 cents to 2.9 cents and 0.9 cents to 2.1 cents, respectively.

Note that each of these nine southern sectors that induce large outputs from northern sectors is either agricultural or agricultural processing. Of the four agricultural sectors included, three were livestock and poultry. Final demand for products of nonagricultural southern California sectors do not affect the output of northern California sectors significantly.

All multiplier effects of southern sectors on the North are presented in column 3 of Table 12.

General Interdependence of Regions Contrasted

In general, the total effect on California output is greater in response to a one dollar delivery to final demand from a northern California sector than the corresponding southern California sector. This is true even though the effects of final demand for northern products are concentrated within northern California, rather than being distributed over the entire state as are the effects of demand for many southern California products. The effects of final demand for southern California products are dissipated through the higher out-of-state import requirements of the South. There are only two exceptions to this rule. The total multiplier effects of the forage and "other manufacturing" sectors are higher for the South than for the North. There is no final demand for forage, however; thus, this multiplier has little significance.

Ranking the total output multipliers of all 52 sectors in order of decreasing magnitude (see Tables 11 and 12), it is seen that the North has nine multipliers in the top quartile, while the South has but six. Both the North and the South have 13 multipliers in the top two quartiles, but the North has 21 multipliers in the top three quartiles while the South has only 18.

Weighted Multiplier Effects.--Tables 13 and 14 present the output multipliers weighted by a ten percent change in final demand for products of the northern and southern regions, respectively. Since effects of the North on the South are negligible, only northern effects on the total California economy are shown. Effects of the South are divided into effects on the South and effects on the North.

Aside from the service industries, canning, preserving, and freezing (sector 14) show the largest weighted multiplier effects. A 10 percent change in final demand for products of sector 14 generates $50,523,000 more industry output than a comparable percentage demand change for fabricated metals and machinery, and $27,379,000 more output than a 10 percent demand change for other manufacturing. If all final demands changed by 10 percent, the output effects of the canning, preserving, and freezing sector would account for 8.4 percent of the total induced output change. All agriculture and agricultural processing would be the cause of 26.3 percent of the total output change. Thus, it is seen that agricultural production plays an important role in the northern California economy. Also, in an "across the board" change in final demand, service, trade, and transportation industries would induce 50.8 percent of the output change, while manufacturing, mining, and utility industries would induce only 22.9 percent of the change in output requirements.

TABLE 13

Weighted Output Multipliers for Products of Northern California Industry Sectors, Model III (thousands of dollars)

Northern sector	1954 final demand for northern products	Output effects of a 10% change in northern California final demand on the Calif. economy[a/]
	1	2
N. 1 Meat animals and products	13,700	2,247
N. 2 Poultry and eggs	104,547	26,439
N. 3 Farm dairy products	34,071	5,989
N. 4 Grains	23,123	3,434
N. 5 Cotton	249,982	33,460
N. 6 Vegetables	213,482	27,240
N. 7 Fruit (excluding citrus) and nuts	72,476	10,300
N. 8 Citrus	26,102	3,443
N. 9 Forage	- 1,574	218
N. 10 Misc. agriculture	39,907	5,806
N. 11 Grain mill products	58,129	11,312
N. 12 Meat processing	376,679	78,903
N. 13 Dairy products	255,934	59,064
N. 14 Canning, preserving, freezing	862,895	174,330
N. 15 Misc. agri. processing	531,839	104,804
N. 16 Chemicals & fertilizers	125,399	21,896
N. 17 Petroleum	565,823	108,191
N. 18 Fabricated metals & machinery	759,087	123,807
N. 19 Aircraft	134,309	20,079
N. 20 Primary metals	93,323	15,096
N. 21 Other manufacturing	984,861	146,951
N. 22 Mining	130,388	17,681
N. 23 Utilities	155,267	21,268
N. 24 Selected services	1,258,904	199,133
N. 25 Trade and transportation	2,803,708	371,968
N. 26 Unallocated services	3,625,965	481,746

a/ Output effects of a 10 percent change in final demand of the sector listed on the left. Northern effects on the South are negligible.

TABLE 14

Weighted Output Multipliers for Products of Southern California Industry Sectors, Model III
(thousands of dollars)

Southern sector	1954 final demand for southern products	Output effects of a 10% change in southern Calif. final demand on the southern Calif. economy[a]	Output effects of a 10% change in southern Calif. final demand on the northern Calif. economy[a]	Output effects of a 10% change in southern Calif. final demand on the Calif. economy[b]
	1	2	3	4
S. 1 Meat animals and products	8,351	1,136	185	1,321
S. 2 Poultry and eggs	84,763	17,050	2,415	19,465
S. 3 Farm dairy products	23,326	3,380	458	3,838
S. 4 Grains	3,246	461	13	474
S. 5 Cotton	32,146	4,253	5	4,258
S. 6 Vegetables	106,424	13,479	10	13,489
S. 7 Fruit (excluding citrus) and nuts	13,786	1,968	3	1,951
S. 8 Citrus	97,473	12,838	12	12,850
S. 9 Forage	- 446	62	--	62
S. 10 Miscellaneous agriculture	39,905	5,359	42	5,401
S. 11 Grain mill products	58,981	8,491	1,779	10,270
S. 12 Meat processing	452,762	67,947	3,790	71,737
S. 13 Dairy products	179,030	36,588	2,237	38,825
S. 14 Canning, preserving, freezing	270,860	53,883	571	54,454
S. 15 Miscellaneous agri. processing	502,734	84,062	1,680	85,742
S. 16 Chemicals and fertilizer	152,058	25,695	92	25,787
S. 17 Petroleum	714,269	122,735	84	122,819
S. 18 Fabricated metals & machinery	1,339,802	212,439	166	212,605
S. 19 Aircraft	3,989,963	586,908	524	587,432
S. 20 Primary metals	89,045	14,311	16	14,327
S. 21 Other manufacturing	1,407,090	215,184	260	215,444
S. 22 Mining	105,133	14,012	34	14,046
S. 23 Utilities	158,117	20,705	133	20,838
S. 24 Selected services	2,379,831	363,345	2,588	365,933
S. 25 Trade and transportation	3,495,388	459,353	893	460,246
S. 26 Unallocated services	4,510,012	591,228	2,053	593,281

a/ Output effects of a 10 percent change in final demand of the sector listed on the left.

b/ Column 2 plus column 3.

Output effects on the South from an "across the board" change in final demand for southern products are caused by a very different proportion of sectors. Final demand for agricultural products is the causative factor for only 10.6 percent of the change. Demand for aircraft causes 20.0 percent of the change itself. All manufacturing, mining, and utility industries account for 41.3 percent of the change, while the service, trade, and transportation industries cause about one half (48.1 percent) of the total change as they do in the North.

Thus, while final demand for agricultural products was shown as a minor causative factor in determination of the level of the total California economy, it proves to be of considerable importance to the northern region.

Special mention should be made of the absolute effects of a 10 percent change in final demand for aircraft, a minor industry in the North but the major industry of the South. Effects are distributed between regions as follows: Northern output changes $20,079,000 from its share of the 10 percent change in final demand and $524,000 from indirect effects from the South--a total change of $20,603,000. The effect on the South from the South's share of the final demand change is $586,908,000--25 times the output effect on the North.

General Implications of Regional Interdependency in California.--In consequence of the above noted relationships, there may be a tendency of northern California output to fluctuate more widely than output of southern California. The North does not import from the South and generally has smaller out-of-state imports than does the South. Therefore, the effects of a final demand change for northern goods are primarily centered within the North. Consequently, multiplier effects in the North from changes in final demand for northern goods are generally greater than effects in the South resulting from final demand changes for southern goods. In addition, because the South imports from the North, effects from changes in final demand for southern goods are transmitted northward.

However, examination of the particular industries through which the majority of this interdependence occurs suggests that the North may have certain advantages in encouraging rapid and stable economic growth despite the above mentioned tendencies. As population increases, both in the North and in the South, final demand for agricultural products will promote rapid growth of the northern economy. The possibility of a decrease in demand for agricultural products is small; thus, the chance of feeling the output decreasing effects of the large agricultural multipliers is remote. On the other hand, possible destabilizing effects in the North, resulting from changes in final demand for southern California's main industry--aircraft--are also small. Interdependence between the two regions

is almost entirely between agricultural or service sectors. The crucial difference between the North and the South is this: Final demand for defense industries may fluctuate often and widely, independently of California's population; final demand for agricultural products will steadily increase as the population in the United States and California expands.

VII. MULTIPLIER EFFECTS ON CALIFORNIA IMPORTS, EMPLOYMENT AND WAGES, MODEL I

Multiplier effects of final demand on California imports, employment and wages are presented in this section. The methodology on which the following analysis is based is discussed in Section III.[1/]

Net Imports Generated by Requirements for Products of California Industries

Generated imports are a partial measure of the effects of the California economy on the rest of the world. They are only a partial measure of total effects on other economies for the same reason that direct input requirements for California products are only a partial measure of effects on the California economy--the indirect effects resulting from delivery of goods to final demand must also be recognized if a complete measure of effects is to be obtained. While the California model does not specify the particular region of the world from which the imports originate, the greatest portion of generated effects occur in other areas of the United States.

Table 15 presents three measures of imports required by the California economy: (1) direct imports per dollar of output, (2) imports resulting from direct and indirect industry outputs per dollar of final demand, and (3) the total value of imports induced by a 10 percent change in 1954 final demand for products of each sector of the economy.

A 10 percent change in 1954 final demand for the aircraft and parts sector has the largest impact on non-California economies ($69,293,000), aircraft, however, ranks only 8th in direct imports per dollar of output and 9th in direct and indirect imports per dollar of final demand. Total effects are twice as large as the effects of each of the service and trade sectors which so dominate the internal California economy. Out-of-state purchases corresponding to a 10 percent change in final demand for southern California produced aircraft amounts

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1/ See equations (12) through (16) and related discussion.

TABLE 15

Net Imports Generated by Requirements for Products of California Industries, Model I

Sector	Direct imports per dollar of output[a]	Direct and indirect imports per dollar of final demand[b]	Import effects of a 10% change in 1954 final demand for Calif. prod.[c]
	1	2	3
	dollars		$1,000
UC 1 Meat animals and products	.353739	.392666	866
UC 2 Poultry and eggs	.072363	.180811	3,423
UC 3 Farm dairy products	.055503	.103081	592
UC 4 Grains	.068462	.108562	286
UC 5 Cotton	.033015	.058327	1,646
UC 6 Vegetables	.032486	.057577	1,842
UC 7 Fruit (excl. citrus) & nuts	.053865	.090486	781
UC 8 Citrus	.035455	.065763	813
UC 9 Forage	.050275	.082742	17
UC 10 Miscellaneous agriculture	.060401	.091937	734
UC 11 Grain mill products	.092834	.160109	1,889
UC 12 Meat and poultry products	.260102	.416696	34,565
UC 13 Dairy products	.035738	.117580	5,118
UC 14 Canning, etc.	.066258	.158005	17,914
UC 15 Misc. agri. proc.	.147203	.233924	24,373
UC 16 Chemicals & fertilizers	.198791	.288270	8,546
UC 17 Petroleum	.014501	.039901	2,708
UC 18 Fab. metals & machinery	.178915	.276514	58,456
UC 19 Aircraft	.102988	.168012	69,293
UC 20 Primary metals	.264842	.348414	6,166
UC 21 Other manufacturing	.150985	.208517	49,067
UC 22 Mining	.048319	.079069	1,862
UC 23 Utilities	.018332	.030262	947
UC 24 Selected services	.044289	.094903	36,130
UC 25 Trade and transportation	.024028	.042019	26,261
UC 26 Unallocated services	.022469	.042286	33,900

a/ From row 29 in Table II-1.

b/ Obtained by multiplying row vector of import coefficients x column vector of interdependency coefficients corresponding to the sector indicated at the left. The mathematical derivation is shown in equation 16b.

c/ Coefficients of column (2) weighted by 10 percent of 1954 final demand (column 1, Table 9) for products listed at the left.

to $48,690,000; 336 percent more than the transactions with northern California (derived from Model III). The point is this: Southern California, so heavily dependent on the aircraft industry, has stronger links with non-California economies (in this particular sector of production) than with other parts of California itself.

Other industries creating a strong link between non-California and the California economies are fabricated metals and machinery, other manufacturing, the service and trade industries, and meat and poultry processing. The aggregate, agriculture and agricultural processing, would have 32 percent as great an effect on non-California economies as would nonagricultural industries given an equal percentage change in final demand for products of each sector.

Although California is known as a major agricultural state, it had total net agricultural imports of $526,670,000 in 1954. On the other hand, California had total net exports (considering all classes of goods and services) of $868,502,000.[1/]

Employment Generated by Requirements for Products of California Industries

Employment is defined as the average midmonth number of civilian workers, including proprietors and partners of unincorporated businesses as well as hired employees. Force account construction workers are excluded from the employment of the 26 endogenous sectors and included as employment of the construction sectors. For sectors where output was classified by product rather than by establishment (e.g., the ten agricultural sectors) aggregate employment was divided among the individual sectors relative to labor hours required.[2/]

Employment is the physical counterpart of the wage income, managerial income, and proprietors' income components of the household sector. Because of necessity for a common denominator, all previous discussions have been in terms of dollars. This discussion, however, deals with the numbers of men affected by changes in dollars of output or dollars of final demand.

Each direct employment requirement coefficient reflects the several different types and qualities of labor employed within a specific industry. Each direct and indirect requirement coefficient (employment multipliers) reflects

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1/ Including federal government purchases of manufactured and agricultural products. (See Table S.39 in Part II for a summary of net imports and exports by sector of origin.)

2/ See the "household" discussion in Part II of this report for sources and further details.

induced requirements for many types of employees in all other industries as well as employment within the industry originally inducing the employment change.[1/] Direct and indirect employment effects are summarized in Table 16.

Employment Multipliers Compared

The Agricultural Sectors.--Agricultural sectors in general have higher direct labor requirements than other sectors of the economy. The ten sector average is .164 men per thousand dollars of output. The meat animal and product sector with direct inputs of only .052 men per thousand dollars of output is comparable to manufacturing industries with high labor use. The trade and transportation sector with .156 men per thousand dollars of output is the only nonagricultural industry comparable to the agricultural average.

Sectors with the highest direct labor requirements per thousand dollars of output are fruit and nuts (.298 men), citrus (.208 men), and vegetables (.196 men). When both direct and indirect effects are considered, (column 2, Table 16), the farm dairy products sector is second only to the fruit and nut sector.

Agricultural Processing Sectors.--These five agricultural processing sectors have comparatively low direct labor requirements per thousand dollars of output. The agricultural sectors with high direct labor requirements provide major inputs to the processing sectors, therefore, the direct and indirect labor requirements resulting from a thousand dollar delivery to final demand of agricultural processing goods are comparable in magnitude to most manufacturing sectors. One thousand dollars of final demand generates employment requirements of .193 men if for dairy products, .172 men if for cannery products, .098 men if for miscellaneous agricultural processing products, .094 men if for grain mill products, and .084 men if for products of the meat packing industry.

Manufacturing and Mining.--Of the manufacturing and mining industries, final demand for products of "other manufacturing" creates the greatest labor requirements (.110 men). Final demand for fabricated metals and machinery is next (.108 men), followed by aircraft and parts (.088 men).

The California petroleum products industry has the lowest labor requirements of all sectors in response to both output and final demand. Interestingly, final demand for petroleum products has the highest multiplier effect on the gross domestic output of the economy of any nonagricultural sector (ranks number seven in magnitude). While often a high output multiplier is accompanied by a

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1/ See the related methodology and mathematical procedures in Section III, equations (12) through (16).

TABLE 16

Employment[a] Generated by Requirements for Products of California Industries, Model I

Sector	Direct employment per $1000 output (men)	Direct and indirect employment per $1000 final demand (men)	Employment effects of a 10% change in 1954 final demand[b] (men)	Percentage change of total employment resulting from a 10% change in 1954 final demand	Employment effects of a 10% change in 1954 final demand ranked
	1	2	3	4	5
UC 1 Meat animals and products	.052481	.133077	293	0.006	25
UC 2 Poultry and eggs	.092788	.194670	3,685	0.074	13
UC 3 Farm dairy products	.171082	.255400	1,466	0.030	20
UC 4 Grains	.097619	.140070	369	0.007	24
UC 5 Cotton	.148071	.184624	5,209	0.105	12
UC 6 Vegetables	.195997	.223957	7,165	0.144	10
UC 7 Fruit (excluding citrus) and nuts	.297684	.332978	2,872	0.058	17
UC 8 Citrus	.208551	.237769	2,938	0.059	16
UC 9 Forage	.185781	.221995	45	0.001	26
UC 10 Miscellaneous agriculture	.175132	.210288	1,678	0.034	19
UC 11 Grain mill products	.019408	.093517	1,103	0.022	23
UC 12 Meat and poultry products	.018578	.083577	6,933	0.140	11
UC 13 Dairy products	.035913	.193334	8,415	0.170	9
UC 14 Canning, preserving, and freezing	.037260	.172658	19,575	0.395	7
UC 15 Miscellaneous agri. processing	.034639	.097789	10,189	0.205	8
UC 16 Chemicals and fertilizers	.038947	.08642	2,391	0.048	18
UC 17 Petroleum	.018343	.049739	3,375	0.068	15
UC 18 Fabricated metals and machinery	.065359	.108377	22,911	0.462	6
UC 19 Aircraft	.054965	.087851	36,232	0.731	4
UC 20 Primary metals	.046209	.079056	1,399	0.028	21
UC 21 Other manufacturing	.072487	.110327	25,962	0.524	5
UC 22 Mining	.032841	.057544	1,355	0.027	22
UC 23 Utilities	.085332	.109375	3,423	0.069	14
UC 24 Selected services	.089063	.133399	50,786	1.024	3
UC 25 Trade and transportation	.156365	.182374	113,981	2.298	1
UC 26 Unallocated services	.073466	.100072	80,227	1.618	2

a/ Employment includes all civilian workers (i.e., proprietors and partners of unincorporated businesses as well as hired employees).

b/ Coefficients of column 2 weighted by 10 percent of 1954 final demand for products listed on the left.

high employment multiplier, even though direct labor requirements are relatively low (the dairy products industry is an example), correspondence of the two multiplier effects does not necessarily follow. Petroleum evidently induces much indirect output in industries with low labor requirements.

Service and Trade Sectors.--As would be expected, direct labor requirements per dollar of output are high for the service and trade sectors--although not as high as for the vegetable and fruit sectors of the economy. Employment multipliers in response to final demand are not great, however. Total direct and indirect employment requirements are higher than for most manufacturing industries simply because direct labor requirements are so high.

Total Employment Potentials

A comparison of employment effects (Table 16) with output effects (Table 9) shows that a 10 percent change in final demand for unallocated services (including education, medicine, finance, advertising) has a 1.876 percent effect on total state output but only a 1.618 percent effect on state employment. A similar final demand change for trade and transportation services effects state output by only 1.455 percent but requires an employment change of 2.298 percent.

While individual industries show differences in employment and output generating potential, the aggregate sector--agriculture--does not. A 10 percent change in final demand for all processed and unprocessed agricultural products effects both total output and total employment by 1.45 percent. A 10 percent change in final demand for nonagricultural products, however, changes output by a slightly larger percent than it does labor--7.1 percent versus 6.9 percent. The indirect employment effects of final demand for nonagricultural industry are evidently concentrated in the "low labor using" (per dollar of output) manufacturing sectors.

Agriculture's potential (considering relative size of final demand) for inducing employment change is only slightly smaller than for the fabricated metals and machinery sector, the "other manufacturing" sector, and the aircraft sector combined (1.45 percent versus 1.72 percent). These three sectors have much greater output inducing potential, however; a 10 percent change in final demand for products of these sectors (roughly comparable to a 10 percent change in defense spending) induces a 2.29 percent change in total output.

Hired Wages Generated by Requirements for Products of California Industries

Hired wages are not the direct dollar counterpart to employment. Employment includes proprietors, partners, and unpaid family labor, as well as hired

labor. Wages as defined here include hired labor wages only. In the manufacturing industries, most labor (including management) is hired. But in the agricultural and service industries, where proprietors may perform much of the labor themselves, the two measures of employment may vary considerably. Hired wages are particularly relevant, however, since they form the main base for consumer purchases. Accordingly, direct and indirect wage effects are summarized in Table 17.

Wage Multipliers Compared

The Agricultural Sectors.--Comparatively little labor is hired by the meat animal sector (20 dollars per 1,000 dollars of output). Nevertheless, 12 dollars of hired labor requirements are generated within the economy by a 1,000 dollar delivery of meat animals to final demand. This is still the smallest induced hired labor requirement of any sector of the model. One thousand dollars of final demand for fresh fruits and nuts generate the largest hired labor requirement of any sector (586 dollars), much of this requirement is a direct labor input from the fruit and nut sector.1/ Citrus also induces greater than average hired wage requirements per 1,000 dollars of final demand (439 dollars).

All other agricultural sectors generate lower than average wage requirements per 1,000 dollars of final demand. Farm dairy products (176 dollars), with its high output and employment generating power, rivals meat animal as the low wage requirement sector. Of course, much agricultural labor is provided by the proprietor (who receives proprietor's income rather than wages). This is especially true of the farm dairy products sector.

Agricultural Processing Sectors.--Wages induced by final demand for processed agricultural products depend heavily on the wage generating capacity of the sector's main agricultural raw material. Wages required by meat animal and grain production are comparatively small; so are the wages induced by 1,000 dollars of final demand for processed meat and poultry (169 dollars) and grain mill products (230 dollars). Fruits generate the largest wage bill of agriculture. Vegetables generate substantial wages, also. The canning, preserving, and freezing sector generates more wages per 1,000 dollar of final demand (393 dollars) than other processing sectors. Although canning, preserving, and freezing generates the largest total wage bill, direct wages per employee are considerably lower than for other processing sectors. Obviously, large indirect effects are generated in the high wage manufacturing industries.

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1/ Average wage per year per hired employee. See Table S.43 in the supplement.

TABLE 17

Hired Wages Generated by Requirements for Products of California Industries, Model I

Sector	Direct hired wages per $1,000 of output[a]	Direct and indirect hired wages per $1,000 of final demand[b]	Total wage effects of a 10% change in 1954 final demand ($1,000)	Percentage change on hired wages resulting from a 10% change in 1954 final demand	Total wage effects of a 10% change in final demand ranked
	1	2	3	4	5
UC 1 Meat animals and products	19.97	119.63	263	.002	25
UC 2 Poultry and eggs	35.59	249.52	4,724	.039	20
UC 3 Farm dairy products	63.86	176.15	1,011	.008	23
UC 4 Grains	73.31	188.07	496	.004	24
UC 5 Cotton	169.94	249.32	7,034	.058	14
UC 6 Vegetables	183.24	259.54	8,303	.069	14
UC 7 Fruit (excl. citrus) & nuts	481.69	585.85	5,054	.042	19
UC 8 Citrus	350.64	439.46	5,431	.045	18
UC 9 Forage	76.43	174.32	35	c/	26
UC 10 Misc. agriculture	196.89	290.80	2,321	.019	22
UC 11 Grain mill products	81.20	230.15	2,715	.022	21
UC 12 Meat processing	82.21	169.14	14,030	.116	10
UC 13 Dairy products	149.42	317.84	13,835	.114	11
UC 14 Canning, etc.	119.92	392.86	44,542	.368	7
UC 15 Misc. agr. processing	153.91	326.35	34,004	.281	8
UC 16 Chemicals and fertilizers	209.74	362.33	10,742	.089	13
UC 17 Petroleum	119.00	255.88	17,366	.143	9
UC 18 Fabricated metals & mach.	276.55	441.35	93,305	.770	6
UC 19 Aircraft	254.45	382.12	157,596	1.301	3
UC 20 Primary metals	200.31	323.90	5,733	.047	16
UC 21 Other manufacturing	292.66	430.39	101,280	.836	5
UC 22 Mining	150.46	235.93	5,557	.046	17
UC 23 Utilities	308.87	394.50	12,346	.102	12
UC 24 Selected services	167.33	297.75	113,356	.935	4
UC 25 Trade and transportation	481.52	557.97	348,726	2.879	1
UC 26 Unallocated services	147.31	232.20	186,158	1.537	2

a/ Dollars of direct inputs per 1,000 dollars of output by the sector listed.

b/ Dollars of direct and indirect hired wages resulting from a 1,000 dollar delivery to final demand by the sector listed at the left.

c/ Negligible.

Nonagricultural Sectors.--Trade and transportation generate more wages per 1,000 dollars of final demand (558 dollars) than any other sector except fruit and nuts. This sector ranks only twenty-fourth in output multiplier effects. Most other nonagricultural sectors (including fabricated metals and machinery, aircraft, other manufacturing, and utilities) are also significantly higher wage generators (in rank) than output generators. Each sector has high direct wage inputs per unit of output and each sector is heavily interdependent. Petroleum, however, falls from seventh in output to sixteenth in wages per dollar of final demand. The majority of direct household inputs to this sector are capital equipment rather than wages. Indirect wages generated by large indirect output requirements are not enough to counterbalance the large proportion of direct nonwage inputs.

Total Effects of a 10 Percent Change in Final Demand.--A 10 percent change in final demand for all California agricultural products would affect total California wages by 1.1 percent. The same percentage change in final demand for all nonagricultural goods would affect California wages by 7.9 percent. Agriculture's percentage effect on hired wages is smaller than its percentage effects on output or employment. Conversely, nonagricultural industries' percentage effect on hired wages is larger than its effects on output or employment.

Although hired wages per dollar of final demand are low in the unallocated service sector (teachers, nurses, bank workers are examples of direct labor hired--most doctors, lawyers, etc., are self-employed) the sheer weight of final demand makes wage changes caused by this sector the second largest in the economy. Trade and transportation, however, with large direct and indirect requirements and moderately large final demand, has by far the largest wage effects. The three service sectors together (UC 24-26) cause a 4.9 percent change in wages paid due to a 10 percent change in final demand for services. The demand for services creates almost as much wages as the demand for all physical goods.

SUMMARY AND LIMITATIONS

Summary

A structural model of the California economy in 1954 was formulated using the input-output technique. Modifications of this basic model were developed as needed to satisfy the objectives of this study--to quantify and analyze the interaction of economic sectors within California and between California and the rest of the world, both by industrial sector and by region. Agricultural sectors were emphasized. Ten agricultural, five agricultural processing, seven manufacturing and mining, three service sectors, and one trade and transportation sector were included in the endogenous portion of the model. Regions in a second model were defined as northern California, southern California, and the rest of the world.

Dollar transactions were estimated between all producing and consuming sectors. Transactions of California sectors not specified as to regions are summarized in Table I-I (Appendix A). Methodology for constructing this transactions matrix is described in Part II of this report. Dollar transactions between sectors by California region were estimated as described in Part II but are not presented herein.

California agriculture derives 55 percent of its demand from endogenous sectors (sectors for which both inputs and outputs are explained by the model), has net exports amounting to 10 percent of output, and delivers 21 percent of its output to domestic (i.e., California) final demand. While the great majority of agricultural output delivered to endogenous sectors is purchased by the agricultural processing sectors, 5 percent of livestock and poultry output and 18 percent of crop output is purchased internally by agriculture. Nonagricultural industry (including agricultural processing industries), derives only 2 percent of its total demand from agriculture. Thirty-seven percent of nonagricultural industries' total demand is generated internally, domestic final demand absorbs 59 percent of output, while net exports amount to only 2 percent.

Southern California requires small net purchases from several northern California sectors, both for further production and for final demand. Net purchases by northern California from the South do not occur, however, except for motion picture production.

Technical coefficients showing the value of direct inputs from each sector per dollar of output of each sector were computed from the transactions tables and are presented as Tables II-I and II-III (Appendix A). Production of a dollar

of California agricultural output required 25 cents of California produced industrial output. Fourteen cents per dollar of output was purchased from agriculture, while 4 cents out of every output dollar was imported. Nonagricultural industry was much less dependent on California agriculture per dollar of output than it was upon itself. Four cents of inputs come from agriculture, 37 cents of inputs from industry, with only 0.6 cents' worth of net imports. Agricultural processing sectors require more direct inputs from both agriculture and industry than do the other industrial sectors.

Direct inputs per dollar of output, originating in California producing sectors, differ for northern and southern California sectors due to the differing domestic output to domestic consumption ratios of the two regions. In general, northern California sectors have smaller imports from outside of California than do southern California sectors.

Interdependence coefficients, relating the final demand of a single sector to the gross output of each sector, were computed for both models (Tables III-I and III-III).

A one dollar delivery of California produced agricultural products to final demand required 46 cents worth of industrial products. In terms of requirements per dollar of output, this is 25 cents of direct requirements and 14 cents of indirect requirements. Indirect requirements are generated by the circular flow of goods among California industries. Industry requires only 6 cents of agricultural products in response to one dollar of final demand for nonagricultural products. Agriculture is highly dependent upon industrial production; industry (other than agricultural processing sectors) shows minor dependence upon agriculture as a source of inputs. In general, agricultural processing sectors have stronger generative powers per dollar of final demand than do other industries. This is due to their large agricultural inputs in addition to industrial inputs of the same general size as for other industries.

Although net direct dependence between northern California and southern California is slight (and flows only one way) indirect dependence of the two sectors is considerable. Final demand for products of northern California induces production in a few southern sectors although direct inputs from the South to the North were zero (except for motion picture production). Final demand for products of any southern sector induces requirements for products of almost all northern sectors. The largest North-South link is through the grain mill products sector. One dollar's worth of final demand for southern grain mill products induces total output requirements of 30 cents in northern California sectors.

More employment is generated by one dollar of final demand for products of the fruit and nuts sector (.333 men per thousand dollars of final demand) than from a dollar of final demand for products of any other sector. Fruit and nuts also generate more hired labor wages (586 dollars per 1,000 dollars of final demand) even though average agricultural wages (comprising the direct portion of this wage requirement) are lower than wages in industry. The California sector generating the largest import requirement per dollar of final demand is meat and poultry processing (42 cents). Direct imports per unit of output are largest for the meat animal sector.

Limitations

The basic assumptions of the input-output models presented are (1) each input per unit of output is assumed to be fixed and (2) aggregation errors are absent in combining industries and commodities into a manageable number of sectors.

Tests of the validity of these assumptions over time have been made by other researchers on previous models. Some have concluded that the advantages of input-output in presenting a complete structural system for analysis at least balanced predictive errors made because of imperfect aggregation and changing input-output coefficients. However, these tests were made on national models rather than on regional models. The smaller the region under consideration, the greater are the relative importance of imports in the model. As the relative size of imports increases, greater potential exists for the input-output coefficients to change abruptly over time. Thus, the margin for error in predictive results is greater in the California model than in some previous formulations.

Data and time limitations must always be recognized but are not peculiar to input-output analysis. Although limitations exist, if results presented herein are interpreted with caution they provide additional quantitative information on the structural interdependence of the California economy. Further, these results provide the basis for further dynamic structural studies of the California economy.

APPENDIX A

BASIC INPUT-OUTPUT TABLES

TABLE I – 1

INTERINDUSTRY FLOWS OF GOODS AND SERVICES BY INDUSTRY OF ORIGIN AND DESTINATION, CALIFORNIA ECONOMY, 1954, MODEL I [a]

(THOUSAND OF DOLLARS)

Sector Number		1 Meat Animals	2 Poultry & Eggs	3 Farm Dairy Prod.	4 Grains	5 Cotton	6 Veg.	7 Fruit & Nuts	8 Citrus	9 Forage	10 Misc. Agri.	11 Grain Mill Prod.	12 Meat & Poultry Prac.	13 Dairy Prod.	14 Canning, Preserve., Freeze.	15 Misc. Agri. Prac.	16 Chem. & Fert.	17 Petro-leum	18 Fab. Metals & Mach.	19 Air-craft	20 Primary Metals	21 Other Mfg.	22 Mining	23 Utilities	24 Selected Services	25 Trade & Trans.	26 Unal-located	Sector Number
1	MEAT ANIMALS AND PRDOUCTS	-	-	-	-	-	-	-	-	-	-	-	314804	-	-	-	-	-	-	-	-	26	-	-	-	-	-	1
2	POULTRY AND EGGS	-	57363	-	-	-	-	-	-	-	-	-	62851	32	6	2655	-	-	-	-	-	-	-	-	-	-	-	2
3	FARM DAIRY PRODUCTS	-	-	9325	-	-	-	-	-	-	-	-	-	276821	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4	FOOD AND FEED GRAINS	14394	21919	7702	8419	-	-	-	-	-	350	115216	-	-	-	3262	98	-	-	-	-	-	-	-	-	-	-	4
5	COTTON	-	-	-	-	1084	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1117	-	-	-	-	-	5
6	VEGETABLES	-	-	-	-	-	5562	-	-	-	-	-	-	-	154636	7735	-	-	-	-	-	-	-	-	-	-	-	6
7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-	207818	45384	180	-	-	-	-	-	-	-	-	-	-	7
8	CITRUS	-	-	-	-	-	-	-	2	-	-	-	-	-	13440	-	-	-	-	-	-	-	-	-	-	-	-	8
9	FORAGE	89709	-	79862	-	-	-	-	-	-	6920	6732	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
10	MISCELLANEOUS AGRICULTURE	107	-	1976	8109	28939	16206	13260	3507	10391	8081	-	-	-	68074	48620	4735	-	-	-	-	2961	-	-	-	-	-	10
11	GRAIN MILL PRODUCTS	15665	107137	30981	-	-	-	-	-	-	124	25025	250	179	8496	83727	2114	-	5	-	143	-	-	5	10386	543	962	11
12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	420	2019	42804	1629	14431	22387	16725	6	-	-	-	1935	-	577	77365	1719	14677	12
13	DAIRY PRDOUCTS	-	-	-	-	-	-	-	-	-	-	958	850	47752	926	13562	549	-	-	-	-	368	-	357	60700	3962	5368	13
14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	1067	2217	1014	19614	11254	932	-	-	-	-	-	-	263	46308	704	4213	14
15	MISCELLANEOUS AGRI. PROCESSING										1000	12620	5102	22049	95645	311259	15085	2	14		5	1679		645	187603	21552	10945	15
16	CHEMICALS AND FERTILIZERS	907	1015	1122	7722	8785	8129	12357	2879	4348	4708	3682	3934	2121	14097	55191	170725	31525	36213	20503	3202	91407	8098	851	26487	14601	34202	16
17	PETRDLEUM	855	1195	1259	4056	2064	4014	9732	1952	3053	8568	621	984	1317	1385	4699	20289	1064846	9619	17416	18114	27924	6604	80177	24822	129396	135634	17
18	FABRICATED METALS AND MACHINERY	1070	1713	3885	9568	4116	8554	13688	3769	9126	13521	3163	7868	8083	85251	21827	11670	31101	796402	412878	8540	111591	7518	12569	205357	80039	10600	18
19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2669	416166	-	-	-	-	788	5712	-	19
20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7477	776	311489	162192	183417	34638	3025	1161	189	11793	2691	20
21	OTHER MANUFACTURING	566	6877	1214	581	712	19596	7282	6101	475	2880	11413	5667	9789	59358	54188	26987	19063	190169	184327	11559	838179	7858	8630	106719	172987	503917	21
22	MINING	-	-	-	21	61	76	164	38	57	27	56	-	-	-	222	11496	1954	1066	-	22512	28109	4306	-	-	423	-	22
23	UTILITIES	1434	1641	1399	549	789	1274	2970	701	294	3055	2134	3424	4477	7116	16375	12453	21802	32122	50772	14906	61696	11452	195940	108059	173200	546237	23
24	SELECTED SERVICES	820	1661	1316	3937	1877	3870	8951	1993	3552	5931	1136	2267	3721	9050	15666	2751	9617	12421	16437	2250	23562	7900	8663	183135	201317	93237	24
25	TRADE AND TRANSPORTATION	15994	30373	14809	15511	12601	22522	18157	6942	11479	15460	27937	26700	19839	33520	74884	34346	115508	140669	97549	41179	203546	8071	33277	256598	288407	336928	25
26	UNALLOCATED	2553	5268	7268	1685	2259	2770	5715	2456	2502	5988	7590	5556	6091	40163	57410	34041	59217	55244	70919	8153	85215	6350	28641	305299	735718	674346	26
27	SCRAP AND BYPRODUCTS	9212	937	6249	-	-	-	-	-	-	298	39274	44959	-	-	-	39800	9	3472	-	66523	12865	-	836	-	-	-	27
28	NET IMPORTS	119168	22593	19068	13537	9387	15848	18295	4858	9110	17805	37477	266914	20393	80924	254241	172009	41483	715217	468553	237253	696082	14791	29133	196382	195895	229478	28
29	MAINTENANCE CONSTRUCTION	3766	2222	4140	2640	3465	4059	2680	1065	1714	3256	526	1963	2164	4362	5117	1435	4412	10384	17557	3914	12423	495	90035	23883	203156	753644	29
30	NEW CONSTRUCTION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
31	STATE AND LOCAL GOVERNMENTS	5667	4662	10660	7759	6536	9794	11572	4699	10119	8732	1248	1933	4086	9115	14198	5835	64656	23711	15196	5396	31965	19809	159465	135223	341393	994838	31
32	FEDERAL GOVERNMENT	268	815	558	1036	1411	2169	1973	752	1177	2238	8180	9647	12598	46074	74325	42243	149457	190314	108594	35301	236035	12677	110777	242972	554942	229111	32
37	HOUSEHOLDS	54726	44826	140750	112599	200243	363396	212646	95323	114006	187418	95624	215695	126474	247900	528955	231299	1265253	1466314	2490548	233461	2106926	187175	827219	2235837	5015171	5631997	37
	GROSS DOMESTIC OUTLAY	336881	312217	343543	197729	284329	487839	339642	137017	181203	294778	403698	1026189	570629	1221341	1727143	865274	2860687	3997514	4549607	895828	4610249	306109	1589221	4434112	8152630	10213025	G.D.D.

TABLE I – 1 (Continued) [a]

Sector Number		27 Scrap & Byprod.	28 Net Exports	29 Maint. Constr.	30 New Constr.	31 State & Local Gov.	32 Federal Gov.	33 Inven-tory Addit'n	34 Inven-tory Depler'n	35 Gross Pri. Cap. Form.	36 Farm House-holds	37 Other House-holds	Gross Domestic Output	Sector Number
1	MEAT ANIMALS AND PRODUCTS	147	-	-	-	-	-	18532	-	-	3372	-	336881	1
2	POULTRY AND EGGS	-	1637	-	-	450	-	13	-	-	13420	173790	312217	2
3	FARM DAIRY PRODUCTS	45357	-	-	-	-	-	2044	-	-	9996	-	343543	3
4	FOOD AND FEED GRAINS	-	-	-	-	-	-	26369	-	-	-	-	197729	4
5	COTTON	35561	227897	-	-	-	-	18670	-	-	-	-	284329	5
6	VEGETABLES	1724	141307	-	-	529	-	-	-7572	-	11113	172805	487839	6
7	FRUIT (excluding Citrus) AND NUTS	-	49766	-	-	528	-	658	-	-	1362	33946	339642	7
8	CITRUS	-	108603	-	-	25	-	-	-	-	857	14090	137017	8
9	FORAGE	-	-	-	-	-	-	-	-2020	-	-	-	181203	9
10	MISCELLANEOUS AGRICULTURE	40	44614	-	-	-	-	4060	-	-	-	31098	294778	10
11	GRAIN MILL PRODUCTS	1057	-	-	-	195	-	433	-	-	-	116271	403698	11
12	MEAT AND POULTRY PROCESSING	33163	-	-	-	3685	-	-	-2246	-	-	794893	1026189	12
13	DAIRY PRODUCTS	-	-	-	-	1940	-	-	-1057	-	-	434394	570629	13
14	CANNING, PRESERVING, FREEZING	314	826736	-	-	1048	-	18983	-	-	-	286674	1221341	14
15	MISCELLANEOUS AGRI. PRDCESSING	4587	-	-	292	1899	-	5692	-	-	-	1029468	1727143	15
16	CHEMICALS AND FERTILIZERS	51455	-	53470	23705	4593	-	959	-	-	-	162281	865274	16
17	PETROLEUM	1231	601456	50162	63299	9857	-	-	-568	25	-	554630	2860687	17
18	FABRICATED METALS AND MACHINERY	17905	-	172581	535785	26483	-	-	-11345	583887	-	788751	3997514	18
19	AIRCRAFT AND PARTS	10772	4103078	-	-	17	-	-	-2242	11217	-	1430	4549607	19
20	PRIMARY METALS	16629	-	31344	126825	43	-	638	-	-	-	1501	895828	20
21	OTHER MANUFACTURING	8718	-	147639	701087	26182	-	-	-3019	73783	-	1398765	4610249	21
22	MINING	-	155609	16318	55924	50	-	-	-	-	-	7620	306109	22
23	UTILITIES	-	-	2215	12353	38379	44713	-	-	-	-	215290	1589221	23
24	SELECTED SERVICES	-	552025	29394	110595	15239	10851	-	-	-	-	3088970	4434112	24
25	TRADE AND TRANSPORTATION	-	264277	250958	629195	16037	303264	-	-	233573	-	455250	8152630	25
26	UNALLOCATED	-	120000	19112	190112	89282	394704	-	-	119507	-	628065	10213025	26
27	SCRAP AND BYPRODUCTS	-	-	238	3616	-	-	372	-	-	-	-	228660	27
28	NET IMPORTS	-	-	137380	410205	33130	2762	-	-	288508	-	1982484	6760363	28
29	MAINTENANCE CONSTRUCTION	-	-	270	-	362272	109830	-	-	-	-	21285	1658134	29
30	NEW CONSTRUCTION	-	-	-	-	711184	300000	-	-	3799000	-	-	4810184	30
31	STATE AND LOCAL GOVERNMENTS	-	-	5415	26880	134013	360374	-	-	1699	-	1526803	3963451	31
32	FEDERAL GOVERNMENT	-	-	17223	69020	-	16426	-	-	34909	-	3266036	5479258	32
37	HOUSEHOLDS	-	-	724415	1851291	1566227	3649000	-	-	124422	-	322610	32669746	37
	GROSS DOMESTIC OUTLAY	228660	7197005	1658134	4810184	3846830	5191924	97423	-30069	5270530	40120	2725905		G.D.O.

a) Each entry shows the value of goods and services produced by the California sector listed at the left that were purchased by the California sector listed at the top.

TABLE II – 1

TECHNICAL COEFFICIENTS, CALIFORNIA ECONOMY, 1954, MODEL 1 a/

Sector Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Sector Numbers
		Meat Animals	Poultry & Eggs	Farm Dairy Prod.	Grains	Cotton	Veg.	Fruit & Nuts	Citrus	Forage	Misc. Agri.	Grain Mill Prod.	Meat & Poultry Proc.	Dairy Prod.	Canning, Preserve., Freeze.	Misc. Agri. Proc.	Chem. & Fert.	Petro-leum	Fab. Metals & Mach.	Air-craft	Primary Metals	Other Mfg.	Mining	Utilities	Selected Services	Trade & Trans.	Unal-located	
1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	.306770	-	-	-	-	-	-	-	-	.000006	-	-	-	-	-	1
2	POULTRY AND EGGS	-	.183728	-	-	-	-	-	-	-	-	-	.061247	.000056	.000005	.001537	-	-	-	-	-	-	-	-	-	-	-	2
3	FARM DAIRY PRODUCTS	-	-	.027144	-	-	-	-	-	-	-	-	-	.485115	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4	FOOD AND FEED GRAINS	.042727	.070204	.022419	.042578	-	-	-	-	-	.001187	.285401	-	-	-	.001889	.000113	-	-	-	-	-	-	-	-	-	-	4
5	COTTON	-	-	-	-	.003812	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000242	-	-	-	-	-	5
6	VEGETABLES	-	-	-	-	-	.011401	-	-	-	-	-	-	-	.126612	.004478	-	-	-	-	-	-	-	-	-	-	-	6
7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-	.170156	.026277	.000208	-	-	-	-	-	-	-	-	-	-	7
8	CITRUS	-	-	-	-	-	-	-	.000015	-	-	-	-	-	.011004	-	-	-	-	-	-	-	-	-	-	-	-	8
9	FORAGE	.266292	-	.232466	-	-	-	-	-	-	.023475	.016676	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
10	MISCELLANEOUS AGRICULTURE	.000318	-	.005752	.041011	.101780	.033220	.039041	.025595	.057344	.027414	-	-	-	.055737	.028151	.005472	-	-	-	-	.000642	-	-	-	-	-	10
11	GRAIN MILL PRODUCTS	.046500	.343149	.090181	-	-	-	-	-	-	.000421	.061989	.000244	.000314	.006956	.048477	.002443	-	.000001	-	.000160	-	-	-	.000003	.002342	.000067	.000094	11
12	MEAT AND POULTRY PRDCESSING	-	-	-	-	-	-	-	-	-	.001425	.005001	.041712	.002855	.011816	.012962	.019329	.000002	-	-	-	.000420	-	.000363	.017447	.000211	.001437	12
13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	.002373	.000828	.083683	.000758	.007852	.000634	-	-	-	-	.000080	-	.000224	.013689	.000486	.000526	13
14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	.002643	.002160	.001777	.016059	.006516	.001077	-	-	-	-	-	-	.000165	.010443	.000086	.000412	14
15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	.003392	.031261	.004972	.038640	.078311	.180216	.017434	.000001	.000003	-	.000006	.000364	-	.000406	.042309	.002643	.001072	15
16	CHEMICALS AND FERTILIZERS	.002692	.003251	.003266	.039053	.030897	.016663	.036382	.021012	.023995	.015971	.009121	.003834	.003717	.011542	.031955	.197307	.011020	.009059	.004506	.003574	.019827	.026454	.000535	.005973	.001791	.003349	16
17	PETROLEUM	.002538	.003827	.003664	.020513	.007259	.008228	.028654	.014246	.016848	.029066	.001538	.000959	.002308	.001134	.002721	.023448	.372234	.002406	.003828	.020220	.006056	.021574	.050450	.005598	.015872	.013280	17
18	FABRICATED METALS AND MACHINERY	.003176	.005487	.011309	.048389	.014476	.017534	.040301	.027507	.050363	.045868	.007835	.007667	.014165	.069801	.012638	.013487	.010872	.199224	.090750	.009533	.024205	.024560	.007909	.046313	.009817	.001038	18
19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000667	.091473	-	-	-	-	.000178	.000701	-	19
20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.008641	.000271	.077920	.035650	.204746	.007513	.009882	.000730	.000043	.001446	.000263	20
21	OTHER MANUFACTURING	.001680	.022026	.003534	.002938	.002504	.040169	.021440	.044527	.002621	.009770	.028271	.005523	.017155	.048601	.031374	.031189	.006664	.047572	.040515	.012903	.181808	.025670	.005430	.024067	.021218	.049341	21
22	MINING	-	-	-	.000106	.000214	.000156	.000483	.000277	.000315	.000092	.000139	-	-	-	.000129	.013286	.000683	.000267	-	.025130	.006097	.014066	-	-	.000052	-	22
23	UTILITIES	.004257	.005256	.004072	.002776	.002775	.002611	.008744	.005116	.001622	.010364	.005286	.003337	.007846	.005826	.009481	.014392	.007621	.008035	.011160	.016639	.013382	.037411	.123293	.024370	.021245	.053484	23
24	SELECTED SERVICES	.002434	.005320	.003830	.019911	.006601	.007932	.026354	.014546	.019602	.020120	.002814	.002209	.006521	.007410	.009070	.003179	.003362	.003107	.003613	.002512	.005111	.025808	.005451	.041301	.024693	.009129	24
25	TRADE AND TRANSPORTATION	.047477	.057262	.043107	.078448	.044318	.046157	.053459	.050885	.065349	.052446	.069203	.028018	.034787	.027445	.043357	.039694	.040378	.035189	.021441	.045967	.044151	.026386	.020939	.057869	.035376	.032990	25
26	UNALLOCATED	.007578	.016872	.021156	.008522	.007945	.005678	.017415	.017779	.012704	.013522	.018801	.005219	.010674	.032835	.033240	.039341	.013709	.013820	.015587	.009101	.018483	.020679	.018022	.068852	.090243	.066028	26
27	SCRAP AND BYPROOUCTS	.027345	.003001	.018190	-	-	-	-	-	-	.001011	.097286	.043811	-	-	-	.045997	.000003	.000868	-	.074259	.002790	-	.000526	-	-	-	27
29	NET IMPORTS	.353739	.072363	.055503	.068462	.033015	.032486	.053865	.035455	.050275	.060401	.092834	.260102	.035738	.066258	.147203	.198791	.014501	.178915	.102988	.264842	.150985	.048319	.018332	.044289	.024028	.022469	28
29	MAINTENANCE CONSTRUCTION	.011179	.007117	.012051	.013352	.012187	.008320	.007891	.007773	.009459	.011046	.001303	.001913	.003792	.003571	.002963	.001658	.001542	.002598	.003859	.004369	.002694	.001617	.056653	.005386	.024919	.073792	29
30	NEW CONSTRUCTION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
31	STATE AND LOCAL GOVERNMENTS	.016822	.014931	.031029	.039241	.022987	.020076	.034071	.034295	.055843	.029622	.003091	.001884	.007160	.007463	.008221	.006744	.022602	.005931	.003340	.006023	.006933	.064712	.100342	.030496	.041875	.097408	31
32	FEDERAL GOVERNMENT	.000796	.002610	.001624	.005239	.004963	.004446	.005809	.005488	.006495	.007592	.020263	.009400	.022077	.037724	.043033	.048820	.052245	.047608	.023869	.039406	.051198	.041413	.069705	.054796	.068069	.022433	32
37	HOUSEHOLDS	.162449	.143573	.409701	.569461	.704265	.744910	.626089	.695702	.629162	.635794	.236870	.210190	.221640	.202974	.306260	.267313	.442290	.366806	.547420	.260609	.457009	.611465	.520518	.504236	.615160	.551452	37

a) Each entry shows dollars of direct purchases from the California sector listed at the left by the California sector listed at the top per dollar of out put of the latter sector.

TABLE III – 1

INTERDEPENDENCY COEFFICIENTS, CALIFORNIA ECONOMY, 1954, MODEL 1 a/

Sector Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Sector Numbers
		Meat Animals	Poultry & Eggs	Farm Dairy Prod.	Grains	Cotton	Veg.	Fruit & Nuts	Citrus	Forage	Misc. Agri.	Grain Mill Prod.	Meat & Poultry Proc.	Dairy Prod.	Canning, Preserve., Freeze.	Misc. Agri. Proc.	Chem. & Fert.	Petro-leum	Fab. Metals & Mach.	Air-craft	Primary Metals	Other Mfg.	Mining	Utilities	Selected Services	Trade & Trans.	Unal-located	
1	MEAT ANIMALS AND PRODUCTS	1.000296	.001132	.000408	.000541	.000399	.000256	.000543	.000339	.000406	.000812	.002241	.320397	.001579	.004708	.005750	.007974	.000222	.000183	.000131	.000117	.000456	.000433	.000220	.006308	.000345	.000645	1
2	POULTRY AND EGGS	.000079	1.225396	.000110	.000138	.000102	.000066	.000139	.000087	.000104	.000211	.000630	.078383	.000566	.001347	.003716	.002003	.000057	.000047	.000033	.000030	.000114	.000111	.000056	.001651	.000094	.000163	2
3	FARM DAIRY PRODUCTS	.000209	.000893	1.028198	.000265	.000132	.000124	.000299	.000188	.000238	.000254	.001742	.000668	.544579	.001080	.005535	.000677	.000107	.000092	.000080	.000086	.000173	.000274	.000224	.008134	.000552	.000440	3
4	FOOD AND FEED GRAINS	.059559	.224002	.053743	1.044731	.000281	.000140	.000257	.000161	.000235	.001671	.318960	.033645	.029695	.004729	.022765	.002509	.000081	.000072	.000051	.000111	.000133	.000164	.000069	.002922	.000211	.000186	4
5	COTTON	.000003	.000015	.000004	.000004	1.003829	.000014	.000009	.000015	.000003	.000005	.000012	.000004	.000010	.000022	.000015	.000014	.000005	.000019	.000016	.000006	.000299	.000010	.000003	.000012	.000009	.000017	5
6	VEGETABLES	.000057	.000298	.000088	.000064	.000036	1.011562	.000071	.000043	.000055	.000076	.000633	.000376	.000502	.130749	.006663	.000352	.000024	.000020	.000017	.000018	.000032	.000063	.000045	.001752	.000087	.000092	6
7	FRUIT (excluding Citrus) AND NUTS	.000147	.000801	.000230	.000160	.000101	.000075	1.000170	.000105	.000133	.000237	.001725	.000693	.001931	.175754	.033711	.001296	.000063	.000052	.000041	.000042	.000090	.000144	.000086	.003488	.000223	.000176	7
8	CITRUS	.000004	.000018	.000005	.000004	.000002	.000002	.000005	1.000018	.000004	.000004	.000038	.000029	.000030	.011195	.000095	.000019	.000002	.000001	.000001	.000001	.000002	.000004	.000003	.000128	.000005	.000007	8
9	FORAGE	.267695	.008261	.241323	.001260	.002621	.000919	.001177	.000765	1.001564	.024474	.019212	.086401	.128303	.003465	.004837	.002575	.000092	.000078	.000059	.000059	.000193	.000194	.000115	.003765	.000236	.000287	9
10	MISCELLANEOUS AGRICULTURE	.018849	.010832	.022883	.044568	.105542	.034843	.040655	.026661	.059364	1.030073	.016355	.007169	.014034	.073702	.039219	.008321	.000202	.000201	.000140	.000108	.001115	.000358	.000094	.003031	.000271	.000235	10
11	GRAIN MILL PRODUCTS	.049904	.449597	.099296	.000507	.000377	.000242	.000513	.000319	.000404	.001076	1.069006	.045466	.056022	.013759	.065856	.005961	.000198	.000182	.000127	.000331	.000305	.000404	.000157	.007418	.000551	.000432	11
12	MEAT AND POULTRY PROCESSING	.000967	.003688	.001331	.001764	.001299	.000835	.001770	.001103	.001324	.002647	.007303	1.044420	.005145	.015346	.018741	.025991	.000724	.000594	.000425	.000381	.001462	.001409	.000715	.020561	.001122	.002102	12
13	DAIRY PRDOUCTS	.000419	.001791	.000596	.000531	.000265	.000248	.000599	.000377	.000478	.000510	.003493	.001339	1.092306	.002167	.011100	.001358	.000215	.000185	.000160	.000173	.000347	.000549	.000448	.016312	.001107	.000882	13
14	CANNING, PRESERVING, FREEZING	.000329	.001629	.000500	.000387	.000200	.000173	.000439	.000267	.000341	.000365	.003409	.002605	.002736	1.017351	.008649	.001759	.000147	.000122	.000106	.000108	.000176	.000402	.000306	.011663	.000492	.000631	14
15	MISCELLANEOUS AGRI. PROCESSING	.003344	.019719	.005386	.003151	.002195	.001523	.003236	.002041	.002610	.006458	.043316	.009406	.055528	.100393	1.226471	.028039	.001252	.001039	.000782	.000843	.002027	.002603	.001250	.057106	.005260	.002545	15
16	CHEMICALS AND FERTILIZERS	.016642	.025493	.017499	.054314	.042162	.024097	.049314	.029745	.033449	.024170	.033097	.012921	.018160	.036238	.056421	1.251292	.023227	.017398	.010131	.008558	.031979	.036186	.002854	.013914	.004865	.007114	16
17	PETROLEUM	.018734	.026503	.020752	.043183	.021217	.019151	.054491	.029483	.035097	.054089	.021989	.011322	.019195	.024079	.018351	.054917	1.598426	.014095	.013606	.046986	.018500	.043325	.093844	.018985	.032527	.030702	17
18	FABRICATED METALS AND MACHINERY	.028901	.034557	.038564	.070897	.022347	.028171	.058633	.040948	.070639	.065279	.038135	.023040	.043740	.113723	.032562	.027872	.024456	1.254808	.129074	.019167	.040225	.036666	.014020	.067607	.016981	.006188	18
19	AIRCRAFT AND PARTS	.000087	.000173	.000094	.000133	.000067	.000067	.000103	.000083	.000117	.000105	.000121	.000072	.000105	.000143	.000089	.000073	.000075	.000968	1.100808	.000067	.000080	.000063	.000036	.000316	.000826	.000041	19
20	PRIMARY METALS	.003308	.004664	.004327	.007924	.003385	.003689	.006836	.005097	.007613	.007054	.004840	.002722	.005074	.012611	.004613	.017292	.003564	.124123	.062863	1.260258	.016181	.017133	.002674	.007521	.004087	.001850	20
21	OTHER MANUFACTURING	.011816	.062779	.017616	.016186	.011013	.055834	.037673	.062897	.014389	.022330	.050364	.017873	.039410	.092138	.062846	.058507	.019763	.079548	.066603	.026268	1.230733	.040400	.012168	.047431	.036477	.068222	21
22	MINING	.000508	.000982	.000584	.001206	.000977	.000952	.001624	.001239	.001107	.000808	.001112	.000412	.000709	.001564	.001487	.017721	.001644	.004243	.002197	.032441	.008482	1.015483	.000253	.000721	.000479	.000591	22
23	UTILITIES	.010895	.021814	.012385	.010985	.008792	.007936	.017725	.012368	.008783	.018340	.016126	.010877	.020723	.020649	.023518	.029692	.018972	.019081	.020586	.029629	.024455	.049444	1.144588	.039723	.033912	.068895	23
24	SELECTED SERVICES	.012532	.019561	.013933	.026256	.011350	.011398	.031455	.018509	.024691	.025006	.015166	.008862	.017303	.020401	.017926	.008476	.008230	.006962	.006607	.006701	.009299	.029658	.008081	1.048039	.028674	.012422	24
25	TRADE AND TRANSPORTATION	.081552	.186595	.081422	.098287	.058128	.057520	.070021	.063791	.078373	.068172	.116494	.068859	.090504	.071782	.079496	.066195	.072073	.058729	.038148	.067093	.063472	.039370	.031694	.079619	1.047306	.044577	25
26	UNALLOCATED	.024425	.057526	.040778	.026405	.019607	.016175	.033449	.030925	.027541	.027660	.042813	.021784	.043298	.059640	.061170	.064901	.033274	.029018	.027503	.022454	.034337	.033252	.027803	.091977	.105947	1.079646	26

a) Each entry shows dollars of direct and indirect requirements for products of the California sector listed at the left per dollar of final demand for products of the California sector listed at the top.

TABLE II – III (part 1)

TECHNICAL COEFFICIENTS, CALIFORNIA ECONOMY 1954, MODEL III[a]

NORTHERN CALIFORNIA SECTORS

Sector Number		1 Meat Animals	2 Poultry & Eggs	3 Farm Dairy Prod.	4 Grains	5 Cotton	6 Veg.	7 Fruit & Nuts	8 Citrus	9 Forage	10 Misc. Agri. Proc.	11 Grain Mill Prod.	12 Meat & Poultry Proc.	13 Dairy Prod.	14 Canning, Preserve., Freeze.	15 Misc. Agri. Proc.	16 Chem. & Fert.	17 Petroleum	18 Fab. Metal & Mach.	19 Aircraft	20 Primary Metals	21 Other Mfg.	22 Mining	23 Utilities	24 Selected Services	25 Trade & Trans.	26 Unallocated	Sector Numbers
N. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	.462142	-	-	-	-	-	-	-	-	.000004	-	-	-	-	-	N. 1
N. 2	POULTRY AND EGGS	-	.183727	-	-	-	-	-	-	-	-	-	.061246	.000056	.000004	.001537	-	-	-	-	-	-	-	-	-	-	-	N. 2
N. 3	FARM DAIRY PRODUCTS	-	-	.037834	-	-	-	-	-	-	-	-	-	.480900	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 3
N. 4	FOOD AND FEED GRAINS	.046872	.084124	.024125	.047217	-	-	-	-	-	.001819	.329925	-	-	-	.002000	.000115	-	-	-	-	-	-	-	-	-	-	N. 4
N. 5	COTTON	-	-	-	-	.003812	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000189	-	-	-	-	-	N. 5
N. 6	VEGETABLES	-	-	-	-	-	013125	-	-	-	-	-	-	-	.126611	.006600	-	-	-	-	-	-	-	-	-	-	-	N. 6
N. 7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-	.218719	.041080	.000328	-	-	-	-	-	-	-	-	-	-	N. 7
N. 8	CITRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 8
N. 9	FORAGE	.270188	-	236868	-	-	-	-	-	-	.033395	.016674	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 9
N. 10	MISCELLANEOUS AGRICULTURE	.000316	-	.005750	.041012	.101779	.033219	.039041	.025592	.059233	.032126	-	-	-	.008131	.039238	.000720	-	-	-	-	.001586	-	-	-	-	-	N. 10
N. 11	GRAIN MILL PRODUCTS	.049669	.366502	.096323	-	-	-	-	-	-	.000569	.066207	.000259	.000338	.007430	.041676	.002609	-	.000001	-	.000172	-	-	.000004	.002421	.000071	.000101	N. 11
N. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	.000213	.004941	.041210	.002840	.011674	.011454	.019097	.000002	-	-	-	.000218	-	.000333	.016678	.000208	.001420	N. 12
N. 13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	.002771	.000968	.098440	.000884	.007755	.000740	-	-	-	-	.000109	-	.000244	.015453	.000567	.000613	N. 13
N. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	.002645	.002160	.001793	.016059	.005801	.001078	-	-	-	-	-	-	.000154	.010104	.000086	.000413	N. 14
N. 15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	.000569	.034512	.005490	.043008	.086455	.221020	.019248	.000001	.000005	-	.000006	.000411	-	.000423	.045194	.002919	.001183	N. 15
N. 16	CHEMICALS AND FERTILIZERS	.002539	.003069	.003081	.042590	.033798	.017647	.038210	.022067	.024933	.020929	.010669	.005058	.003535	.015472	.043092	.219053	.011264	.008659	.004251	.003468	.010675	.024951	.000499	.005861	.001701	.003159	N. 16
N. 17	PETROLEUM	.002539	.003827	.003665	.020514	.007259	.008227	.028652	.014252	.016859	.031876	.001540	.000959	.002327	.001134	.002583	.023447	.404102	.002429	.003830	.020220	.009397	.021571	.052633	.005764	.015872	.013280	N. 17
N. 18	FABRICATED METALS AND MACHINERY	.003395	.005769	.011290	.052814	.015520	.018910	.043474	.029615	.052174	.055168	.006747	.006559	.012109	.058949	.010862	.011882	.009558	.183235	.079200	.008545	.014406	.024309	.006618	.044932	.008962	.000902	N. 18
N. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000714	.091473	-	-	-	-	.000172	.000701	-	N. 19
N. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.010532	.000334	.102592	.055134	.252547	.004478	.015434	.000983	.000048	.002192	.000297	N. 20
N. 21	OTHER MANUFACTURING	.001427	.024737	.002875	.002996	.001998	.032292	.015262	.030841	.002788	.012884	.035096	.004276	.018149	.044748	.029379	.030067	.006416	.042576	.036201	.009918	.195729	.020004	.004828	.021585	.019761	.043046	N. 21
N. 22	MINING	-	-	-	.000104	.000215	.000156	.000484	.000268	.000332	.000113	.000140	-	-	-	.000187	.013285	.000712	.000250	-	.025130	.005477	.014068	-	-	.000052	-	N. 22
N. 23	UTILITIES	.004519	.005577	.004323	.002946	.002949	.002775	.009283	.005440	.001699	.012821	.005611	.003544	.008399	.006187	.010144	.015281	.008447	.008420	.011845	.017667	.013196	.039724	.135837	.026105	.022557	.056789	N. 23
N. 24	SELECTED SERVICES	.002433	.005322	.003832	.019912	.006602	.007932	.026355	.014558	.019119	.024968	.002812	.002209	.006574	.007410	.008520	.003179	.003267	.003059	.003613	.002512	.006925	.025807	.005243	.041642	.024693	.009129	N. 24
N. 25	TRADE AND TRANSPORTATION	[illegible]	[illegible]	.043100	.078443	.044319	.048188	.053458	.050647	.060526	.058494	.039200	.028019	.035031	.027445	.042396	.039693	.043790	.035285	.021440	.045968	.050512	.026367	.021595	.057457	.035376	.032990	N. 25
N. 26	UNALLOCATED	.007581	.016872	.021157	.008521	.007947	.005677	.017416	.017776	.013238	.011359	.018802	.005220	.010762	.032835	.032946	.039340	.013723	.013758	.015590	.009100	.018923	.020677	.017502	.066695	.090243	.066028	N. 26
N. 27	SCRAP AND BYPRODUCTS	.027586	.003029	.018350	-	-	-	-	-	-	.001275	.098146	.044199	-	-	-	.049017	.000004	.000912	-	.074915	.002698	-	.000557	-	-	-	N. 27
S. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 1
S. 2	POULTRY AND EGGS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 2
S. 3	FARM DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 3
S. 4	FOOD AND FEED GRAINS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 4
S. 5	COTTON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 5
S. 6	VEGETABLES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 6
S. 7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 7
S. 8	CITRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 8
S. 9	FORAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 9
S. 10	MISCELLANEOUS AGRICULTURE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 10
S. 11	GRAIN MILL PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 11
S. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 12
S. 13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 13
S. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 14
S. 15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 15
S. 16	CHEMICALS AND FERTILIZERS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 16
S. 17	PETROLEUM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 17
S. 18	FABRICATED METALS AND MACHINERY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 18
S. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 19
S. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 20
S. 21	OTHER MANUFACTURING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 21
S. 22	MINING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 22
S. 23	UTILITIES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 23
S. 24	SELECTED SERVICES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 24
S. 25	TRADE AND TRANSPORTATION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 25
S. 26	UNALLOCATED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.002656	-	-	S. 26
S. 27	SCRAP AND BYPRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 27
28	NET IMPORTS	.338725	.031938	.028462	.055777	.029404	.037842	.054504	.045667	045007	.050304	.032026	.105094	.018965	.068071	113776	.172120	.015633	.183151	.098936	.219425	122205	.047869	.011404	.043331	.024015	025564	28
29	MAINTENANCE CONSTRUCTION	.011178	.007117	.012050	.013351	.012185	.008322	.007891	.007777	.009820	.013822	.001304	.001914	.003823	.003571	.003038	.001658	.001547	.002611	.003856	.004370	.002474	.001618	.056009	.005377	.024919	073792	29
30	NEW CONSTRUCTION	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30
31	STATE AND LOCAL GOVERNMENTS	.016821	.014930	.031033	.039238	.022989	.020076	.034070	.034289	.058022	.032669	.003093	.001883	.007218	.007463	.008303	.006743	.020495	.005921	.003336	.006024	.007335	.064713	.100708	.030095	.041875	.097409	31
32	FEDERAL GOVERNMENT	.000795	.002610	.001624	.005241	.004962	.004446	.005810	.005479	.006998	.006208	.020261	.009401	.022259	.037724	.043461	.048819	.049818	.047708	.023869	.039406	.054405	.041411	.070509	.053986	.068069	.022433	32
37	HOUSEHOLDS	.165939	.143567	.414250	.569323	.704262	.743189	.626090	.695732	.629251	.598421	.236877	.210189	.223453	.213023	.272953	.271949	.410887	.358715	.547425	.260608	.478647	.611477	.513916	.504445	.615160	.551452	37

a) Each entry shows dollars of direct purchases from the northern or southern California sector listed at the left by the northern California sector listed at the top per dollar of out put of the latter sector.

TABLE II – III (part 2)

TECHNICAL COEFFICIENTS, CALIFORNIA ECONOMY, 1954, MODEL III [a]

SOUTHERN CALIFORNIA SECTORS (S. 1 – S. 13)

Sector Number		S. 1 Meat Animals	S. 2 Poultry & Eggs	S. 3 Farm Dairy Prod.	S. 4 Grains	S. 5 Cotton	S. 6 Veg.	S. 7 Fruit & Nuts	S. 8 Citrus	S. 9 Forage	S. 10 Misc. Agri. Proc.	S. 11 Grain Mill Prod.	S. 12 Meat & Poultry Proc.	S. 13 Dairy Prod.
N. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 2	POULTRY AND EGGS	-	.029669	-	-	-	-	-	-	-	-	-	.009890	.000009
N. 3	FARM DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 4	FOOD AND FEED GRAINS	.025715	.046167	.013240	.024858	-	-	-	-	-	.000386	.181069	-	-
N. 5	COTTON	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 6	VEGETABLES	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 8	CITRUS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 9	FORAGE	.122350	-	.107279	-	-	-	-	-	-	.005778	.007552	-	-
N. 10	MISCELLANEOUS AGRICULTURE	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 11	GRAIN MILL PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	.000224	.000080	.007895
N. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	.000007	.000038	.000005	.000047
N. 16	CHEMICALS AND FERTILIZERS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 17	PETROLEUM	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 18	FABRICATED METALS AND MACHINERY	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 21	OTHER MANUFACTURING	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 22	MINING	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 23	UTILITIES	.000183	.000229	.000179	.000132	.000121	.000114	.000387	.000225	.000060	.000363	.000230	.000146	.000338
N. 24	SELECTED SERVICES	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 25	TRADE AND TRANSPORTATION	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 26	UNALLOCATED	-	-	-	-	-	-	-	-	-	-	-	-	-
N. 27	SCRAP AND BYPRODUCTS	.002473	.000273	.001646	-	-	-	-	-	-	.000067	.008809	.003967	-
S. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	.179053	-
S. 2	POULTRY AND EGGS	-	.154061	-	-	-	-	-	-	-	-	-	.051357	.000047
S. 3	FARM DAIRY PRODUCTS	-	-	.011551	-	-	-	-	-	-	-	-	-	.491194
S. 4	FOOD AND FEED GRAINS	.006740	.012102	.003471	.006545	-	-	-	-	-	.000104	.047448	-	-
S. 5	COTTON	-	-	-	-	.003814	-	-	-	-	-	-	-	-
S. 6	VEGETABLES	-	-	-	-	-	.007486	-	-	-	-	-	-	-
S. 7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-
S. 8	CITRUS	-	-	-	-	-	-	-	.000018	-	-	-	-	-
S. 9	FORAGE	.135922	-	.119174	-	-	-	-	-	-	.006416	.008394	-	-
S. 10	MISCELLANEOUS AGRICULTURE	.000321	-	.005754	.040989	.101789	.033223	.039037	.025596	.049001	.021823	-	-	-
S. 11	GRAIN MILL PRODUCTS	.043180	.318667	.083741	-	-	-	-	-	-	.000274	.057569	.000226	.000287
S. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	.002885	.005053	.042133	.002850
S. 13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	.001805	.000630	.062954
S. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	.002641	.002161	.001754
S. 15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	.006105	.028041	.004460	.034254
S. 16	CHEMICALS AND FERTILIZERS	.002418	.002913	.002927	.040460	.032114	.016782	.036329	.020998	.022453	.011379	.010149	.004810	.003295
S. 17	PETROLEUM	.002537	.003828	.003664	.020495	.007264	.008230	.028669	.014245	.016802	.025732	.001537	.000959	.002281
S. 18	FABRICATED METALS AND MACHINERY	.004011	.006800	.013319	.062343	.018312	.022310	.051302	.034946	.072142	.047533	.007962	.007738	.014001
S. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-
S. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-
S. 21	OTHER MANUFACTURING	.001474	.025539	.002963	.003107	.002058	.033344	.015785	.031862	.003109	.024931	.036238	.004416	.018366
S. 22	MINING	-	-	-	.000132	.000212	.000154	.000464	.000279	.000239	.000067	.000137	-	-
S. 23	UTILITIES	.003874	.004779	.003700	.002578	.002512	.002375	.007970	.004652	.001555	.007581	.004812	.003035	.007052
S. 24	SELECTED SERVICES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.007935	.026347	.014543	.021735	.014368	.002816	.002209	.006444
S. 25	TRADE AND TRANSPORTATION	.047475	.097282	.043105	.078474	.044311	.046169	.053468	.050669	.075819	.045270	.069206	.026019	.034357
S. 26	UNALLOCATED	.007574	.016874	.021155	.008528	.007930	.005681	.017410	.017779	.010344	.016089	.018800	.005219	.010548
S. 27	SCRAP AND BYPRODUCTS	.022922	.002515	.015244	-	-	-	-	-	-	.000601	.081548	.036722	-
28	NET IMPORTS	.384422	.104745	.096294	.062475	.028542	.034538	.048981	.040932	.039614	.039106	.156407	.391377	.050361
29	MAINTENANCE CONSTRUCTION	.011182	.007117	.012052	.013354	.012198	.008317	.007893	.007772	.007863	.007752	.001301	.001912	.003748
30	NEW CONSTRUCTION	-	-	-	-	-	-	-	-	-	-	-	-	-
31	STATE AND LOCAL GOVERNMENTS	.016823	.014934	.031024	.039270	.022973	.020076	.034085	.034297	.046221	.026007	.003090	.001884	.007078
32	FEDERAL GOVERNMENT	.000797	.002611	.001625	.005223	.004964	.004447	.005803	.005491	.004275	.009235	.020265	.009400	.021815
37	HOUSEHOLDS	.155172	.143581	.403066	.571136	.704289	.748819	.626069	.695695	.628767	.680140	.236861	.210191	.219026

SOUTHERN CALIFORNIA SECTORS (S. 14 – S. 26)

Sector Number		S. 14 Canning, Preserve., Freeze.	S. 15 Misc. Agri. Proc.	S. 16 Chem. & Fert.	S. 17 Petroleum	S. 18 Fab. Metals & Mach.	S. 19 Aircraft	S. 20 Primary Metals	S. 21 Other Mfg.	S. 22 Mining	S. 23 Utilities	S. 24 Selected Services	S. 25 Trade & Trans.	S. 26 Unallocated	Sector Number
N. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 1
N. 2	POULTRY AND EGGS	-	.000248	-	-	-	-	-	-	-	-	-	-	-	N. 2
N. 3	FARM DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 3
N. 4	FOOD AND FEED GRAINS	-	.001073	.000064	-	-	-	-	-	-	-	-	-	-	N. 4
N. 5	COTTON	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 5
N. 6	VEGETABLES	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 6
N. 7	FRUIT (excluding Citrus) AND NUTS	.008330	.002231	.000028	-	-	-	-	-	-	-	-	-	-	N. 7
N. 8	CITRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 8
N. 9	FORAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 9
N. 10	MISCELLANEOUS AGRICULTURE	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 10
N. 11	GRAIN MILL PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 11
N. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 12
N. 13	DAIRY PRODUCTS	.000073	.000889	.000060	-	-	-	-	.000007	-	.000023	.001333	.000046	.000050	N. 13
N. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 14
N. 15	MISCELLANEOUS AGRI. PROCESSING	.000092	.000184	.000021	-	-	-	-	-	-	-	.000051	.000003	.000001	N. 15
N. 16	CHEMICALS AND FERTILIZERS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 16
N. 17	PETROLEUM	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 17
N. 18	FABRICATED METALS AND MACHINERY	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 18
N. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 19
N. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 20
N. 21	OTHER MANUFACTURING	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 21
N. 22	MINING	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 22
N. 23	UTILITIES	.000253	.000408	.000625	.000319	.000352	.000485	.000723	.000610	.001630	.005173	.001054	.000924	.002326	N. 23
N. 24	SELECTED SERVICES	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 24
N. 25	TRADE AND TRANSPORTATION	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 25
N. 26	UNALLOCATED	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 26
N. 27	SCRAP AND BYPRODUCTS	-	-	.004398	-	.000095	-	.006721	.000370	-	.000046	-	-	-	N. 27
S. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	.000002	-	-	-	-	-	S. 1
S. 2	POULTRY AND EGGS	.000006	.001289	-	-	-	-	-	-	-	-	-	-	-	S. 2
S. 3	FARM DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 3
S. 4	FOOD AND FEED GRAINS	-	.000282	.000017	-	-	-	-	-	-	-	-	-	-	S. 4
S. 5	COTTON	-	-	-	-	-	-	-	.000278	-	-	-	-	-	S. 5
S. 6	VEGETABLES	.126613	.001910	-	-	-	-	-	-	-	-	-	-	-	S. 6
S. 7	FRUIT (excluding Citrus) AND NUTS	.022878	.006128	.000077	-	-	-	-	-	-	-	-	-	-	S. 7
S. 8	CITRUS	.042488	-	-	-	-	-	-	-	-	-	-	-	-	S. 8
S. 9	FORAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 9
S. 10	MISCELLANEOUS AGRICULTURE	.191937	.014730	.009555	-	-	-	-	.000012	-	-	-	-	-	S. 10
S. 11	GRAIN MILL PRODUCTS	.006459	.055650	.002269	-	.000001	-	.000146	-	-	.000002	.002219	.000062	.000087	S. 11
S. 12	MEAT AND POULTRY PROCESSING	.011937	.014768	.019524	.000002	-	-	-	.000558	-	.000391	.017981	.000213	.001452	S. 12
S. 13	DAIRY PRODUCTS	.000579	.007089	.000483	-	-	-	-	.000054	-	.000183	.010633	.000370	.000400	S. 13
S. 14	CANNING, PRESERVING, FREEZING	.016059	.007381	.001076	-	-	-	-	-	-	.000176	.010656	.000086	.000412	S. 14
S. 15	MISCELLANEOUS AGRI. PROCESSING	.070253	.139970	.015639	.000001	.000003	-	.000004	.000322	-	.000382	.038724	.002371	.000961	S. 15
S. 16	CHEMICALS AND FERTILIZERS	.014709	.041537	.208291	.009964	.008079	.004042	.003298	.023159	.023730	.000487	.005223	.001617	.003004	S. 16
S. 17	PETROLEUM	.001135	.002887	.023449	.343685	.002395	.003828	.020221	.003824	.021577	.048410	.005494	.015872	.013280	S. 17
S. 18	FABRICATED METALS AND MACHINERY	.069555	.012851	.014017	.012075	.207313	.093445	.010085	.031312	.028688	.008353	.050082	.010574	.001064	S. 18
S. 19	AIRCRAFT AND PARTS	-	-	-	-	.000645	.091473	-	-	-	-	.000181	.000710	-	S. 19
S. 20	PRIMARY METALS	-	-	.006703	.000277	.066947	.035097	.160770	.007966	.009828	.000581	.000032	.001395	.000189	S. 20
S. 21	OTHER MANUFACTURING	.046205	.031949	.031044	.006226	.041317	.037377	.010239	.204703	.020660	.005324	.021636	.020403	.044445	S. 21
S. 22	MINING	-	.000058	.013287	.000657	.000275	-	.025130	.006511	.014066	-	-	.000052	-	S. 22
S. 23	UTILITIES	.005298	.008544	.013089	.006660	.007355	.010150	.015135	.012752	.034026	.108197	.022043	.019323	.048647	S. 23
S. 24	SELECTED SERVICES	.007410	.009737	.003180	.003447	.003130	.003613	.002511	.003898	.025808	.005646	.041089	.024694	.009129	S. 24
S. 25	TRADE AND TRANSPORTATION	.027446	.044279	.039694	.037321	.035143	.021441	.045967	.039897	.026565	.026526	.058126	[illegible]	[illegible]	S. 25
S. 26	UNALLOCATED	.032836	.033596	.039342	.013697	.013849	.015588	.009102	.018190	.020681	.018508	.068541	.090243	.066028	S. 26
S. 27	SCRAP AND BYPRODUCTS	-	-	.040724	.000002	.000882	-	.062244	.003423	-	.000427	-	-	-	S. 27
28	NET IMPORTS	.074467	.160245	.192787	.014799	.185395	.104971	.317297	.141048	.053743	.024463	.049354	.025650	.030446	28
29	MAINTENANCE CONSTRUCTION	.003572	.002872	.001659	.001538	.002591	.003859	.004369	.002842	.001616	.057256	.005392	.024919	.073793	29
30	NEW CONSTRUCTION	-	-	-	-	-	-	-	-	-	-	-	-	-	30
31	STATE AND LOCAL GOVERNMENTS	.007464	.008121	.006744	.024489	.005936	.003340	.006023	.006665	.064711	.099999	.030746	.041875	.097409	31
32	FEDERAL GOVERNMENT	.037724	.042516	.048821	.054419	.047560	.023869	.039406	.049053	.041416	.068953	.055302	.068069	.022433	32
37	HOUSEHOLDS	.174222	.346578	.263330	.470423	.370737	.547420	.260610	.442542	.611452	.526691	.504105	.615160	.551452	37

a) *Each sector shows dollars of direct purchases from the northern or southern California sector listed at the left by the southern California sector listed at the top per dollar of output of the latter sector.*

TABLE III – III (part I)

INTERDEPENDENCY COEFFICIENTS, CALIFORNIA ECONOMY, 1954, MODEL III [a]

Sector Number		NORTHERN CALIFORNIA SECTORS																									Sector Number
		N. 1	N. 2	N. 3	N. 4	N. 5	N. 6	N. 7	N. 8	N. 9	N. 10	N. 11	N. 12	N. 13	N. 14	N. 15	N. 16	N. 17	N. 18	N. 19	N. 20	N. 21	N. 22	N. 23	N. 24	N. 25	N. 26	
		Meat Animals	Poultry & Eggs	Farm Dairy Prod.	Grains	Cotton	Veg.	Fruit & Nuts	Citrus	Forage	Misc. Agri.	Grain Mill Prod.	Meat & Poultry Proc.	Dairy Prod.	Canning, Preserve., Freeze.	Misc. Agri. Prac.	Chem. & Fert.	Petro-leum	Fab. Metals & Mach.	Air-craft	Primary Metals	Other Mfg.	Mining	Utilities	Selected Services	Trade & Trans.	Unals. located	
N. 1	MEAT ANIMALS AND PRODUCTS	1.000456	.001834	.000639	.000840	.000585	.000368	.000808	.000490	.000584	.000711	.003439	.482518	.002434	.007060	.008310	.012190	.000355	.000251	.000178	.000177	.000455	.000619	.000312	.009114	.000500	.000942	N. 1
N. 2	POULTRY AND EGGS	.000082	1.225424	.000116	.000143	.000099	.000063	.000138	.000084	.000100	.000123	.000654	.078362	.000596	.001371	.003782	.002042	.000061	.000043	.000030	.000031	.000077	.000106	.000053	.001603	.000093	.000159	N. 2
N. 3	FARM DAIRY PRODUCTS	.000255	.001137	1.039693	.000316	.000161	.000146	.000350	.000219	.000275	.000337	.002098	.000842	.554982	.001282	.005919	.000825	.000135	.000109	.000095	.000107	.000234	.000316	.000255	.009360	.000649	.000519	N. 3
N. 4	FOOD AND FEED GRAINS	.067827	.275463	.063740	1.049920	.000403	.000193	.000349	.000217	.000324	.002427	.372344	.050617	.035564	.005847	.024703	.003348	.000113	.000093	.000065	.000148	.000142	.000207	.000089	.003686	.000266	.000245	N. 4
N. 5	COTTON	.000002	.000014	.000003	.000003	1.003829	.000009	.000006	.000009	.000003	.000005	.000012	.000004	.000008	.000016	.000012	.000011	.000004	.000014	.000011	.000004	.000237	.000006	.000002	.000008	.000006	.000012	N. 5
N. 6	VEGETABLES	.000071	.000390	.000113	.000075	.000042	1.013333	.000080	.000049	.000061	.000078	.000785	.000422	.000807	.131305	.009687	.000457	.000030	.000023	.000019	.000021	.000039	.000070	.000047	.001883	.000103	.000100	N. 6
N. 7	FRUIT (excluding Citrus) AND NUTS	.000246	.001406	.000395	.000256	.000155	.000115	1.000262	.000161	.000200	.000257	.002861	.001075	.003353	.227327	.054878	.002195	.000107	.000080	.000062	.000069	.000138	.000218	.000123	.005128	.000357	.000260	N. 7
N. 8	CITRUS	-	-	-	-	-	-	-	1.000000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N. 8
N. 9	FORAGE	.271934	.009260	.249056	.001809	.003742	.001309	.001670	.001082	1.002285	.034877	.019982	.131895	.133667	.003375	.006549	.003698	.000136	.000104	.000078	.000083	.000257	.000257	.000151	.004930	.000311	.000395	N. 9
N. 10	MISCELLANEOUS AGRICULTURE	.020057	.013475	.024457	.044838	.105963	.035038	.040711	.026721	.061532	1.035673	.019379	.010983	.015948	.027589	.056635	.002908	.000137	.000195	.000154	.000102	.002209	.000241	.000102	.003581	.000362	.000281	N. 10
N. 11	GRAIN MILL PRODUCTS	.053563	.482468	.107747	.000580	.000428	.000265	.000566	.000347	.000440	.001109	1.074046	.057444	.061128	.014564	.060589	.006687	.000233	.000200	.000139	.000377	.000276	.000428	.000170	.007840	.000585	.000473	N. 11
N. 12	MEAT AND POULTRY PROCESSING	.000987	.003968	.001382	.001817	.001265	.000795	.001748	.001061	.001264	.001538	.007440	1.044091	.005266	.015276	.017981	.026376	.000767	.000543	.000384	.000383	.000973	.001339	.000675	.019721	.001081	.002039	N. 12
N. 13	DAIRY PRODUCTS	.000510	.002274	.000743	.000631	.000323	.000293	.000700	.000438	.000550	.000674	.004197	.001686	1.110386	.002564	.011842	.001651	.000270	.000219	.000189	.000213	.000468	.000633	.000509	.018727	.001298	.001039	N. 13
N. 14	CANNING, PRESERVING, FREEZING	.000343	.001756	.000531	.000392	.000209	.000174	.000436	.000264	.000333	.000406	.003464	.002675	.002831	1.017388	.008169	.001816	.000155	.000121	.000105	.000113	.000185	.000392	.000293	.011315	.000484	.000629	N. 14
N. 15	MISCELLANEOUS AGRI. PROCESSING	.004024	.024633	.006628	.003647	.002289	.001660	.003649	.002270	.002799	.003851	.050858	.011784	.066397	.116602	1.291749	.033485	.001569	.001181	.000885	.001020	.002218	.002940	.001416	.064475	.006066	.002925	N. 15
N. 16	CHEMICALS AND FERTILIZERS	.018383	.031408	.019618	.061140	.047758	.025597	.052911	.031209	.035957	.032035	.041607	.018673	.020576	.045515	.080781	1.286329	.025425	.016192	.009125	.008745	.018680	.034789	.002922	.015040	.004553	.006246	N. 16
N. 17	PETROLEUM	.020712	.031592	.023281	.046683	.023449	.020759	.058209	.031543	.037803	.063971	.026810	.016027	.021897	.026650	.023806	.060169	1.684848	.016946	.015979	.053070	.026425	.046575	.104694	.021260	.034863	.033300	N. 17
N. 18	FABRICATED METALS AND MACHINERY	.030367	.038427	.039976	.075770	.029246	.028872	.061106	.041856	.071988	.077114	.041421	.026849	.041566	.097816	.032770	.024543	.022231	1.229394	.110294	.017756	.024928	.034853	.011857	.063876	.014964	.004772	N. 18
N. 19	AIRCRAFT AND PARTS	.000090	.000185	.000099	.000142	.000071	.000070	.000109	.000086	.000120	.000127	.000131	.000088	.000109	.000137	.000096	.000074	.000082	.001014	1.100801	.000071	.000077	.000064	.000037	.000311	.000826	.000041	N. 19
N. 20	PRIMARY METALS	.004797	.006841	.006186	.011742	.004987	.004826	.009631	.006726	.010775	.011531	.007094	.004361	.006607	.014901	.006398	.022527	.004611	.169806	.097049	1.341578	.011607	.026673	.003429	.009684	.005573	.001794	N. 20
N. 21	OTHER MANUFACTURING	.012153	.073497	.018148	.016412	.010867	.046742	.030212	.046460	.014360	.027299	.061068	.018963	.041903	.084820	.064652	.058340	.020065	.071526	.059947	.022599	1.250233	.033179	.011226	.043678	.034100	.060677	N. 21
N. 22	MINING	.000574	.001156	.000664	.001390	.001091	.000918	.001685	.001163	.001234	.001079	.001329	.000553	.000783	.001674	.001934	.018295	.001799	.005271	.002971	.034485	.007523	1.015647	.000270	.000747	.000479	.000496	N. 22
N. 23	UTILITIES	.012037	.024866	.013873	.012355	.009957	.008531	.019282	.013160	.009731	.022954	.018600	.013868	.023239	.022407	.027804	.032988	.022406	.020982	.022585	.033880	.025163	.053344	1.161616	.043098	.036532	.074047	N. 23
N. 24	SELECTED SERVICES	.012888	.021462	.014571	.026775	.012074	.011676	.031773	.018690	.024590	.031014	.017008	.011218	.018175	.021110	.019614	.008858	.008716	.007120	.006778	.007157	.011932	.029749	.008023	1.048656	.028772	.012532	N. 24
N. 25	TRADE AND TRANSPORTATION	.082733	.195808	.084137	.100248	.059611	.058081	.071012	.063933	.076702	.077956	.123980	.083344	.094381	.073121	.086332	.069198	.082092	.060444	.039410	.071616	.071988	.040045	.033683	.080377	1.047780	.044988	N. 25
N. 26	UNALLOCATED	.025067	.060562	.042046	.027030	.019894	.016123	.033586	.030683	.028012	.027616	.045326	.026332	.045165	.060519	.065585	.067035	.035708	.029087	.027611	.023831	.035581	.033243	.027788	.090072	.105975	1.079604	N. 26
S. 1	MEAT ANIMALS AND PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000001	-	-	S. 1
S. 2	POULTRY AND EGGS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 2
S. 3	FARM DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 3
S. 4	FOOD AND FEED GRAINS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 4
S. 5	COTTON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 5
S. 6	VEGETABLES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 6
S. 7	FRUIT (excluding Citrus) AND NUTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 7
S. 8	CITRUS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 8
S. 9	FORAGE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 9
S. 10	MISCELLANEOUS AGRICULTURE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000001	-	-	S. 10
S. 11	GRAIN MILL PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000001	-	-	S. 11
S. 12	MEAT AND POULTRY PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000006	-	-	S. 12
S. 13	DAIRY PRODUCTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000002	-	-	S. 13
S. 14	CANNING, PRESERVING, FREEZING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000002	-	-	S. 14
S. 15	MISCELLANEOUS AGRI. PROCESSING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000006	-	-	S. 15
S. 16	CHEMICALS AND FERTILIZERS	-	-	-	-	-	-	.000001	-	-	.000001	-	-	-	-	-	-	-	-	-	-	-	.000001	-	.000019	.000001	-	S. 16
S. 17	PETROLEUM	.000001	.000002	.000001	.000002	.000001	.000001	.000002	.000001	.000002	.000002	.000001	.000001	.000001	.000002	.000001	.000001	.000001	.000001	.000001	.000001	.000001	.000002	.000001	.000079	.000002	.000001	S. 17
S. 18	FABRICATED METALS AND MACHINERY	-	-	-	-	-	-	.000001	-	-	.000001	-	-	-	-	-	-	-	-	.000001	-	-	.000001	-	.000019	.000001	-	S. 18
S. 19	AIRCRAFT AND PARTS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S. 19
S. 20	PRIMARY METALS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000004	-	-	S. 20
S. 21	OTHER MANUFACTURING	.000002	.000004	.000002	.000004	.000002	.000002	.000005	.000003	.000004	.000005	.000003	.000002	.000003	.000004	.000003	.000001	.000001	.000001	.000001	.000001	.000002	.000005	.000001	.000176	.000005	.000002	S. 21
S. 22	MINING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.000002	-	-	S. 22
S. 23	UTILITIES	.000002	.000004	.000002	.000004	.000002	.000002	.000005	.000003	.000004	.000005	.000003	.000002	.000003	.000003	.000003	.000001	.000001	.000001	.000001	.000001	.000002	.000005	.000001	.000171	.000005	.000002	S. 23
S. 24	SELECTED SERVICES	-	.000001	-	.000001	-	-	.000001	.000001	.000001	.000001	.000001	-	.000001	.000001	.000001	-	-	-	-	-	-	.000001	-	.000034	.000001	-	S. 24
S. 25	TRADE AND TRANSPORTATION	.000001	.000002	.000002	.000003	.000001	.000001	.000004	.000002	.000003	.000004	.000002	.000001	.000002	.000002	.000002	.000001	.000001	.000001	.000001	.000001	.000001	.000003	.000001	.000121	.000003	.000001	S. 25
S. 26	UNALLOCATED	.000037	.000062	.000042	.000077	.000034	.000033	.000091	.000054	.000070	.000089	.000049	.000032	.000052	.000061	.000056	.000025	.000025	.000020	.000019	.000021	.000034	.000085	.000023	.003006	.000082	.000036	S. 26

a) Each entry shows dollars of direct and indirect requirements for the northern or southern California sectors listed at the left per dollar of final demand for products of the northern California sector listed at the top.

TABLE III – III (part 2)

INTERDEPENDENCY COEFFICIENTS, CALIFORNIA ECONOMY, 1954 MODEL III [a]

Sector Number		SOUTHERN CALIFORNIA SECTORS																									Sector Number
		S. 1 Meat Animals	S. 2 Poultry & Eggs	S. 3 Farm Dairy Prod.	S. 4 Grains	S. 5 Cattan	S. 6 Veg.	S. 7 Fruit & Nuts	S. 8 Citrus	S. 9 Forage	S. 10 Misc. Agri.	S. 11 Grain Mill Prod.	S. 12 Meat & Poultry Prac.	S. 13 Dairy Prod.	S. 14 Canning, Preserve., Freeze.	S. 15 Misc. Agri. Prac.	S. 16 Chem. & Fert.	S. 17 Petro-leum	S. 18 Fab. Metals & Mach.	S. 19 Air-craft	S. 20 Primary Metals	S. 21 Primary Metals	S. 22 Mining	S. 23 Utilities	S. 24 Selected Services	S. 25 Trade & Trans.	S. 26 Unal-located	
N. 1	MEAT ANIMALS AND PRDOUCTS	.000101	.000175	.000089	.000022	.000001	.	.000001	.	.000001	.000005	.000169	.000048	.000069	.000012	.000021	.000003	.	.	.	.	.000001	.000001	.000002	.000007	.000001	.000001	N. 1
N. 2	POULTRY AND EGGS	.000028	.043047	.000032	.000031	.000022	.000013	.000028	.000017	.000021	.000062	.000141	.014974	.000114	.000263	.000717	.000391	.000010	.000009	.000006	.000005	.000026	.000021	.000011	.000322	.000018	.000031	N. 2
N. 3	FARM DAIRY PRODUCTS	.000062	.000161	.000065	.000035	.000014	.000013	.000032	.000020	.000027	.000025	.000236	.000089	.004744	.000117	.000654	.000072	.000011	.000010	.000008	.000009	.000017	.000029	.000026	.000863	.000058	.000046	N. 3
N. 4	FOOD AND FEED GRAINS	.036043	.144105	.031486	.026407	.000136	.000072	.000138	.000086	.000118	.000680	.203694	.017465	.017526	.002867	.015424	.001457	.000043	.000039	.000029	.000060	.000084	.000092	.000040	.001727	.000124	.000106	N. 4
N. 5	COTTON	.	.000001	.	.	.	.	.	.	.	.	.000001	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	N. 5
N. 6	VEGETABLES	.000010	.000024	.000009	.000002	.	.	.	.	.	.	.000016	.000007	.000012	.000002	.000005	.000001	.	.	.	.	.	.	.	.000002	.	.	N. 6
N. 7	FRUIT (excluding Citrus) AND NUTS	.000041	.000129	.000043	.000018	.000008	.000006	.000012	.000008	.000010	.000025	.000164	.000064	.000172	.008680	.002708	.000108	.000004	.000004	.000003	.000003	.000007	.000010	.000006	.000220	.000015	.000011	N. 7
N. 8	CITRUS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	N. 8
N. 9	FORAGE	.123117	.003752	.109640	.000365	.000658	.000235	.000311	.000201	.000355	.006046	.008753	.023386	.058761	.001787	.001794	.000780	.000028	.000025	.000019	.000019	.000062	.000065	.000043	.001409	.000089	.000098	N. 9
N. 10	MISCELLANEOUS AGRICULTURE	.009093	.006414	.008072	.001148	.000047	.000018	.000026	.000017	.000028	.000402	.009224	.002196	.004415	.000592	.000896	.000117	.000004	.000004	.000003	.000004	.000008	.000009	.000005	.000182	.000012	.000012	N. 10
N. 11	GRAIN MILL PRODUCTS	.000080	.017027	.000075	.000029	.000011	.000007	.000015	.000009	.000012	.000030	.000182	.005919	.000598	.000129	.000376	.000165	.000005	.000005	.000004	.000003	.000013	.000012	.000008	.000227	.000014	.000018	N. 11
N. 12	MEAT AND POULTRY PROCESSING	.000218	.000378	.000193	.000047	.000002	.000001	.000002	.000001	.000001	.000010	.000366	.000103	.000149	.000027	.000046	.000007	.000001	.000001	.000001	.000001	.000001	.000002	.000004	.000016	.000002	.000003	N. 12
N. 13	DAIRY PRODUCTS	.000123	.000321	.000130	.000070	.000028	.000026	.000063	.000039	.000055	.000050	.000472	.000178	.009493	.000235	.001308	.000145	.000021	.000019	.000017	.000017	.000034	.000058	.000051	.001727	.000116	.000093	N. 13
N. 14	CANNING, PRESERVING, FREEZING	.000055	.000114	.000049	.000010	.000001	.	.000001	.	.	.000003	.000081	.000035	.000051	.000008	.000014	.000002	.	.	.	.	.000001	.000001	.000002	.000007	.000001	.000001	N. 14
N. 15	MISCELLANEOUS AGRI. PROCESSING	.000476	.001377	.000426	.000102	.000009	.000005	.000012	.000007	.000010	.000038	.000818	.000434	.000869	.000213	.000446	.000067	.000004	.000004	.000004	.000004	.000007	.000011	.000013	.000206	.000017	.000014	N. 15
N. 16	CHEMICALS AND FERTILIZERS	.006514	.009054	.005766	.001552	.000034	.000014	.000023	.000015	.000022	.000262	.012180	.002044	.003258	.000706	.001148	.000131	.000006	.000006	.000005	.000008	.000012	.000015	.000022	.000197	.000017	.000020	N. 16
N. 17	PETROLEUM	.006284	.007297	.005581	.001237	.000071	.000048	.000100	.000067	.000060	.000331	.009447	.001933	.003220	.000798	.001040	.000243	.000082	.000087	.000094	.000129	.000124	.000229	.000629	.000348	.000163	.000318	N. 17
N. 18	FABRICATED METALS AND MACHINERY	.011443	.011298	.010149	.001937	.000063	.000027	.000044	.000029	.000041	.000495	.015329	.003167	.005753	.000887	.001466	.000193	.000015	.000015	.000015	.000021	.000025	.000039	.000078	.000311	.000037	.000053	N. 18
N. 19	AIRCRAFT AND PARTS	.000020	.000025	.000017	.000004	.	.	.	.	.	.000001	.000029	.000007	.000010	.000002	.000003	.	.	.	.	.	.	.	.	.000001	.	.	N. 19
N. 20	PRIMARY METALS	.001727	.001782	.001532	.000301	.000010	.000005	.000008	.000005	.000007	.000076	.002374	.000493	.000872	.000140	.000230	.000032	.000003	.000004	.000004	.000005	.000006	.000009	.000022	.000051	.000008	.000013	N. 20
N. 21	OTHER MANUFACTURING	.002332	.004745	.002070	.000427	.000018	.000010	.000020	.000013	.000015	.000111	.003336	.001462	.001473	.000372	.000458	.000081	.000011	.000011	.000012	.000016	.000018	.000030	.000071	.000156	.000025	.000041	N. 21
N. 22	MINING	.000199	.000223	.000177	.000036	.000001	.000001	.000001	.000001	.000001	.000009	.000281	.000062	.000101	.000021	.000029	.000004	.	.	.	.	.000001	.000001	.000002	.000006	.000001	.000001	N. 22
N. 23	UTILITIES	.002073	.003431	.001966	.000862	.000436	.000390	.000890	.000610	.000449	.000846	.003153	.001132	.001917	.001227	.001381	.001522	.000868	.000927	.001017	.001389	.001296	.002453	.006928	.002027	.001686	.003420	N. 23
N. 24	SELECTED SERVICES	.003941	.004271	.003496	.000686	.000023	.000011	.000019	.000012	.000016	.000173	.005415	.001198	.002019	.000407	.000558	.000077	.000008	.000008	.000009	.000012	.000014	.000022	.000051	.000125	.000019	.000031	N. 24
N. 25	TRADE AND TRANSPORTATION	.012873	.019999	.011412	.002570	.000081	.000040	.000072	.000047	.000059	.000564	.020163	.005542	.006909	.001115	.002040	.000316	.000035	.000035	.000036	.000050	.000057	.000093	.000213	.000519	.000080	.000128	N. 25
N. 26	UNALLOCATED	.004379	.005708	.003888	.000706	.000034	.000019	.000038	.000025	.000027	.000211	.005519	.001769	.002472	.000465	.000655	.000122	.000024	.000025	.000027	.000036	.000037	.000066	.000170	.000218	.000052	.000092	N. 26
S. 1	MEAT ANIMALS AND PRODUCTS	1.000125	.000555	.000190	.000329	.000268	.000161	.000334	.000207	.000255	.000721	.001240	.187050	.000872	.002858	.003654	.004771	.000119	.000103	.000076	.000063	.000321	.000245	.000133	.003781	.000204	.000380	S. 1
S. 2	POULTRY AND EGGS	.000046	1.182329	.000071	.000116	.000094	.000057	.000118	.000073	.000090	.000258	.000476	.063433	.000424	.001109	.003020	.001655	.000042	.000036	.000027	.000022	.000111	.000086	.000047	.001358	.000076	.000132	S. 2
S. 3	FARM DAIRY PRODUCTS	.000121	.000568	1.011868	.000193	.000097	.000091	.000224	.000139	.000194	.000162	.001236	.000457	.530655	.000797	.004610	.000509	.000075	.000067	.000058	.000060	.000119	.000204	.000172	.006152	.000412	.000325	S. 3
S. 4	FOOD AND FEED GRAINS	.008987	.033557	.007850	1.006620	.000033	.000017	.000033	.000020	.000028	.000168	.050830	.003517	.004289	.000698	.003799	.000341	.000010	.000009	.000007	.000015	.000019	.000021	.000009	.000399	.000029	.000024	S. 4
S. 5	COTTON	.000003	.000019	.000004	.000005	1.003832	.000014	.000009	.000014	.000005	.000011	.000016	.000004	.000011	.000025	.000017	.000017	.000005	.000020	.000018	.000006	.000353	.000010	.000003	.000012	.000010	.000018	S. 5
S. 6	VEGETABLES	.000037	.000207	.000061	.000054	.000030	1.007567	.000062	.000038	.000052	.000057	.000488	.000336	.000419	.129944	.003435	.000273	.000019	.000017	.000015	.000014	.000025	.000055	.000042	.001609	.000072	.000084	S. 6
S. 7	FRUIT (excluding Citrus) AND NUTS	.000021	.000123	.000035	.000030	.000022	.000014	1.000032	.000020	.000026	.000062	.000298	.000103	.000340	.023809	.007380	.000287	.000011	.000009	.000007	.000007	.000018	.000025	.000014	.000576	.000039	.000028	S. 7
S. 8	CITRUS	.000011	.000059	.000018	.000016	.000008	.000007	.000019	1.000029	.000016	.000013	.000139	.000107	.000110	.043224	.000395	.000075	.000006	.000005	.000004	.000004	.000007	.000017	.000013	.000504	.000021	.000027	S. 8
S. 9	FORAGE	.136389	.003522	.121453	.000346	.000725	.000256	.000336	.000217	1.000385	.006690	.009270	.025751	.063833	.001926	.001774	.000839	.000028	.000025	.000019	.000019	.000064	.000063	.000040	.001325	.000082	.000095	S. 9
S. 10	MISCELLANEOUS AGRICULTURE	.007716	.002247	.012613	.042854	.104999	.034530	.040548	.026555	.050540	1.023031	.004031	.002221	.007863	.207912	.020773	.013193	.000246	.000199	.000129	.000107	.000496	.000444	.000110	.003415	.000224	.000237	S. 10
S. 11	GRAIN MILL PRODUCTS	.046041	.400824	.090241	.000453	.000354	.000220	.000464	.000287	.000374	.001044	1.063654	.030801	.050456	.012887	.070894	.005369	.000160	.000152	.000109	.000280	.000291	.000347	.000136	.006709	.000499	.000371	S. 11
S. 12	MEAT AND POULTRY PROCESSING	.000701	.003097	.001062	.001840	.001499	.000899	.001862	.001155	.001422	.004024	.006922	1.044660	.004867	.015962	.020405	.026643	.000664	.000575	.000423	.000353	.001780	.001367	.000741	.021117	.001139	.002121	S. 12
S. 13	DAIRY PRODUCTS	.000243	.001144	.000367	.000387	.000195	.000183	.000450	.000280	.000391	.000326	.002488	.000920	1.067858	.001604	.009276	.001024	.000150	.000134	.000117	.000121	.000240	.000410	.000346	.012380	.000829	.000655	S. 13
S. 14	CANNING, PRESERVING, FREEZING	.000258	.001400	.000416	.000379	.000199	.000172	.000442	.000267	.000369	.000313	.003281	.002520	.002592	1.017313	.009301	.001773	.000138	.000119	.000105	.000102	.000170	.000402	.000317	.011867	.000495	.000630	S. 14
S. 15	MISCELLANEOUS AGRI. PROCESSING	.002346	.014693	.003957	.002799	.002250	.001411	.002917	.001827	.002499	.008718	.036173	.007292	.045666	.086910	1.168679	.024326	.000978	.000849	.000651	.000666	.001788	.002176	.001077	.049562	.004499	.002153	S. 15
S. 16	CHEMICALS AND FERTILIZERS	.009150	.015231	.010479	.054672	.043650	.024260	.049568	.029756	.031722	.018264	.021042	.009833	.013889	.036533	.066413	1.268675	.020459	.016060	.009567	.007549	.038564	.033030	.002561	.013038	.004668	.006760	S. 16
S. 17	PETROLEUM	.011309	.016533	.013566	.039540	.019590	.017723	.051574	.027584	.033090	.044869	.009817	.006372	.014244	.021027	.014325	.052508	1.528142	.012149	.012333	.042112	.013746	.040541	.084610	.016919	.030545	.028266	S. 17
S. 18	FABRICATED METALS AND MACHINERY	.021482	.024198	.033193	.087282	.032833	.034779	.073506	.050919	.099121	.067056	.021570	.017167	.040281	.117912	.029499	.030052	.026063	1.267821	.134590	.019479	.053176	.042547	.014712	.073015	.018525	.006709	S. 18
S. 19	AIRCRAFT AND PARTS	.000069	.000143	.000078	.000140	.000070	.000071	.000112	.000088	.000146	.000096	.000086	.000053	.000094	.000140	.000081	.000074	.000069	.000945	1.100808	.000064	.000086	.000066	.000035	.000321	.000826	.000041	S. 19
S. 20	PRIMARY METALS	.002011	.002995	.003017	.007767	.003214	.003556	.006741	.004911	.008516	.006025	.002617	.001685	.003866	.010733	.003648	.013471	.003062	.102143	.057555	1.193885	.016810	.015995	.002172	.006588	.003688	.001566	S. 20
S. 21	OTHER MANUFACTURING	.009585	.066608	.015330	.017205	.012580	.049074	.032208	.049029	.017071	.040896	.057305	.014078	.039087	.091090	.062171	.059880	.017967	.071460	.062823	.020991	1.266201	.034488	.011709	.044037	.035499	.063231	S. 21
S. 22	MINING	.000296	.000810	.000385	.001242	.001002	.000926	.001585	.001171	.001058	.000793	.000906	.000292	.000595	.001483	.001505	.017887	.001501	.003657	.002059	.030708	.009337	1.015388	.000229	.000675	.000472	.000572	S. 22
S. 23	UTILITIES	.008260	.016909	.009536	.009652	.007672	.006944	.015783	.010846	.008274	.013975	.011920	.007790	.017121	.017941	.019587	.026746	.015589	.016664	.018295	.024999	.023268	.044039	1.124703	.035072	.030266	.061481	S. 23
S. 24	SELECTED SERVICES	.008276	.013912	.009871	.025063	.010647	.011023	.031118	.018179	.026794	.018102	.008070	.005844	.014572	.017862	.016191	.008330	.007820	.006753	.006469	.006260	.007842	.029512	.008095	1.047405	.028566	.012229	S. 24
S. 25	TRADE AND TRANSPORTATION	.067926	.159989	.067689	.094883	.057245	.056538	.069416	.062789	.091289	.058529	.090115	.051922	.080521	.068812	.073113	.065721	.063826	.057097	.037423	.062958	.059875	.038499	.029774	.078107	1.046752	.043563	S. 25
S. 26	UNALLOCATED	.019296	.049860	.035475	.025900	.019830	.016019	.033468	.030653	.026766	.028644	.035652	.016517	.039163	.058813	.058147	.065377	.031180	.028530	.027274	.021029	.034578	.032817	.027650	.090825	.105731	1.079226	S. 26

a) Each entry shows dollars of direct and indirect requirements for the northern or southern California sector listed at the left per dollar of final demand for products of the southern California sector listed at the top.

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Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA

A CALIFORNIA INTERINDUSTRY ANALYSIS EMPHASIZING AGRICULTURE

Part II: Statistical Supplement

William E. Martin and Harold O. Carter

CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS
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FOREWORD AND ACKNOWLEDGMENTS

This is Part II of the first report in a series of studies focusing on the structure of the California economy. The research approach is the familiar "Leontief" input-output analysis--also referred to as interindustry analysis; particular emphasis is given to quantifying the interrelationship between agriculture and industry. Part I of this report is concerned primarily with formulating the California input-output models and discussing the implications of the empirical results. Part II, of primary interest to the research worker, relates the tedious and unglamorous aspect of input-output work--the estimating techniques and procedures used in constructing the California interindustry models.

Subsequent studies in this series will give attention to optimization and projections of growth in the California economy.

A number of people were consulted who provided advice, assistance, and supplementary data for the study. Dr. Irving Hoch and Dr. Ivan Lee, Department of Agricultural Economics, University of California, Berkeley, made many valuable suggestions in reviewing a preliminary draft of the report. Dr. Pinhas Zusman, Faculty of Agriculture, Hebrew University, provided unpublished data on labor coefficients for individual sectors. Personnel in various governmental agencies (state and federal) were helpful in supplying both published and unpublished data necessary for the analysis. Much of the statistical calculation was done in the Agricultural Economics Statistical Pool under the supervision of Mrs. Marilyn Vaage. Mrs. Merola Sorg supervised the typing of the manuscript.

A CALIFORNIA INTERINDUSTRY ANALYSIS EMPHASIZING AGRICULTURE
PART II: STATISTICAL SUPPLEMENT

by

William E. Martin[1/] and Harold O. Carter[2/]

I INTRODUCTION

This Statistical Supplement, which is Part II of a two-part report, provides an account of the definitions, assumptions, data sources, and estimating techniques used in deriving the individual output and input estimates for construction of the California Interindustry Models.[3/] The purpose of this report is to (1) provide the reader with a better basis for judging the reliability of the results presented in Part I and (2) present additional details on individual sectors so that other researchers would have a basis for "re-aggregating" the model according to their respective interests.

Sources quoted and procedures outlined relate specifically to the completed models. Often other procedures were attempted and discarded as impractical. Where presumably comparable data showed differences, trial distributions were made and only the sources appearing most consistent with existing sector distributions were used. Hence, the following is not a detailed chronological discussion of estimating techniques and data sources tried and rejected, but rather a brief record of how the final model was constructed.

Repeated references are made to the Bureau of Labor Statistics' input-output model for the United States for 1947 (34, 125, 128)[4/] and the U. S.

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3/ See: Martin, William E. and Harold O. Carter, A California Interindustry Analysis Emphasizing Agriculture, Part I: The Input-Output Models and Results, Giannini Foundation Research Report No.

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4/ Numbered references in parentheses refer to the literature cited section.

Department of Agriculture's inputs to agriculture study for 1955 (51, 97).[1/] The California Model relied heavily on sources, estimation procedures, and industry classifications as quoted in the various publications describing the construction and application of these two models. Each sector is defined in relation to classifications of the USDA and/or BLS studies. A summary of these classification relationships is presented in Tables S.1 and S.2.[2/] Where a more detailed description of the BLS sector is desired, refer to (125).

1/ Because of the regular references to these studies, the following abbreviations are used:

(1) The "1947 BLS study" or the "BLS study" refers to the Bureau of Labor Statistics' 200-sector model of the United States for 1947.

(2) The "1955 USDA study" refers to the Department of Agriculture's study of agriculture's transactions with industry in 1955.

(3) The "UC study" or "UC model" refers to the present 1954 California Model.

2/ Tables listed in this report (Part II) will be prefaced by (S) whereas other tables (e.g., Table I-I, etc.) are listed in Part I. See: Martin and Carter, op. cit.

TABLE S.1

UC Agricultural Input-Output Sectors Defined in Relation to the Department of Agriculture's 1955 Sector Classification

UC classification		Dept. of Agriculture classification[a/]	
Title of sector	UC sector no.	Title of sector	Dept. of Agri. sector component no.
Meat animals and products	1	Meat animals (excludes wool and mohair; includes slaughter of dairy cattle and inputs to pasture consumed by livestock in the sector)	1
Poultry and eggs	2	Poultry and eggs (excludes hatcheries)	2
Farm dairy products	3	Farm dairy products (excludes slaughter of dairy animals, includes inputs to pasture consumed by milk (cows)	3
Food and feed grains	4	Food grains	5
		Feed crops (includes hay)	6
Cotton	5	Cotton	7
Vegetables	6	Vegetables (excl. strawberries)	10
Fruits (excl. citrus) and nuts	7	Fruits (includes citrus and strawberries)	11
		Tree nuts	12
Citrus	8	Fruits (includes all other fruits also)	11
Forage crops	9	Feed crops (includes grains; excludes pasture)	6
Misc. agriculture	10	Oil bearing crops	9
		Legumes and grass seeds	13
		Sugar and sirup crops	14
		Miscellaneous crops	15
		Forest products	16
		Greenhouse and nursery products	17
		Other livestock and products (includes wool and mohair)	4
		Agricultural services (fishing is not included)	18

a/ The difference between the UC sector and its USDA counterpart (51) is explained in parentheses. In addition, inputs to horses and mules are redistributed to the sector using the horse and mule power in the USDA study.

TABLE S.2

UC Nonagricultural Sectors Defined in Relation to the Bureau of Labor Statistics' 1947 Sector Classification

UC sector title	UC sector no.	BLS EM-sector no.
Grain mill products	11	24
Meat and poultry processing	12	21
Dairy Products	13	22
Canning, preserving, freezing	14	23
Misc. agri. processing	15	25-29
Chemicals and fertilizers	16	48-61
Petroleum	17	17, 62-64
Fabricated metal and machinery	18	93-147, 149-152
Aircraft	19	148
Primary metals	20	78-92
Other manufacturing	21	30-47, 65-77, 153-162, 164
Mining	22	11-16, 18-20
Utilities	23	167, 168, 179
Selected services	24	180, 182, 184, 185, 187-190
Trade and transportation	25	169-178
Unallocated services	26	163, 181, 183, 186, 191, 192, 951, 961
Scrap and by-products	27	265-267
Net imports	28	225 plus competitive imports
Maintenance construction	29	212
New construction	30	211
State and local government	31	220
Federal government	32	215
Households	36, 37	200

Source: (125). BLS sectors are sometimes only generally comparable to UC sectors. See individual sector discussions for specific differences.

II CONSTRUCTION OF MODEL I

General Estimation Procedures

Although each of the 37 sectors is described individually, the construction of the flow table is divided into four sections for general comments.

The Agricultural Sectors

The 10 agricultural sectors (the first 10 rows of Table I-I) were developed from USDA, California Department of Agriculture, and private industry crop and livestock statistics. Coverage was relatively complete. In general, direct distributions of the value of the individual commodities were made from 1954 data.

Inputs to Agriculture

Inputs produced by nonagricultural sectors and distributed to agricultural sectors (rows 11 through 26 of columns 1 through 10 in Table I-I) were estimated from six main sources (51, 80, 97, 99, 105, and 108). The two sources from the USDA's 1955 study of agriculture's transactions with industry were the most useful. These sources, (51) and (97), list both producers' and purchasers' values for each major input to United States agriculture for 1955,[1/] thus providing trade and transportation margins. The percent of total expenditure on each product class used by 18 agricultural sectors[2/] of the United States is estimated in (97).

1/ Although this study is for 1955, the data on which the study was based were largely from the 1954 Census of Agriculture. Adjustments made on the 1954 data to convert it to 1955 are not always apparent. Therefore, in many cases where a 1954 control total is not available, the 1955 figure quoted in (51) or (97) was used. After scaling a distribution down for California, however, the resulting total was adjusted to the 1954 California estimate of the Farmer's Cooperative Service (105) wherever possible. Thus, in most cases, the 1955 United States estimate was only a base from which to begin the distribution. The assumption involved is that the relative distribution of a given input to the various using sectors did not vary between 1954 and 1955.

2/ These 18 agricultural sectors were aggregated to the 10 agricultural sectors used in this study with slight modification of sector definition. See Table S.1 for comparisons of sector classifications.

The general procedure used in estimating inputs for agricultural sectors was as follows:

1. Expenditures on (for example) automobile tires were distributed to the 18 sectors for the United States.

2. California's proportion of that expenditure was derived by scaling each sector's input down by California's percent of acres, numbers, physical output, or value output relative to the corresponding total United States figure for each sector. The particular measure used varied depending on the expenditure in question.

3. Each total derived expenditure by California agriculture by expenditure class was compared with estimates in (99) and (105). Unless estimates in (105) were inconsistent with more complete input information, the derived distribution was adjusted proportionately to meet these totals. In most cases the two estimates matched closely.

4. Each input was converted to producers' value using margins from (51).

5. Each sector's inputs were adjusted for differences in definition between the UC and USDA models.

6. The 18 USDA sectors were aggregated to the 10 UC sectors.

This procedure is referred to as the "general method" of distribution in the individual sector discussions that follow.

Industry to Industry Flows

The construction of flows from nonagricultural industries to nonagricultural industries (rows 11 through 26 of columns 11 through 26 in Table I-1) presented special estimation difficulties.

The task of separating and distributing the thousands of products involved is beyond the capabilities of the individual researcher, even if complete current data are available to him. For most of the several hundred California industries input information is not available for any year. To develop new input information on any one industrial group would require a study of major proportions. The one source of complete information in a form usable for input-output work is the 1947 Bureau of Labor Statistics' input-output model for the United States (34, 128). Table II of the BLS study lists technical coefficients--value of inputs per dollar's worth of output--for each of 180 industrial aggregates for the United States for 1947.

The input structure of the nonagricultural sectors was, therefore, derived using the individual technical coefficients from the 1947 United States table, weighted by 1954 California industry outputs.[1/] For example, in the petroleum industry in 1947, purchases of internal combustion engines per dollar of output by the component industries were as listed in column 1 of Table S.3. The value of California production in 1954 for each of these component industries is listed in column 2 of the same table. If purchases per dollar of output are multiplied by the corresponding output, an estimate of total purchases results for each of the 180-sectors. This 180-sector matrix was then aggregated to 16 sectors defined for the California Model.[2/]

Even if one is willing to accept the assumption that industry technical coefficients were uniform throughout the United States, the assumption that technical coefficients have not changed since 1947 is surely in error in varying degrees for each industry. This segment of the model is regarded as the "weakest link." Further refinements, however, must await a concerted effort of government agencies and private industry in making the required information available.[3/]

1/ The input structure of the fishing subsector (included in UC 10) was also computed using the 1947 BLS technical coefficients.

2/ It is possible to aggregate technical coefficients vertically before multiplying by sector outputs without distorting the input structure. This was not done because a rectangular flow table (more rows than columns) was desired. The component row distributions for each sector are presented with the individual sector discussions.

To compute technical coefficients for a horizontal aggregate of sector and apply it to an aggregate output estimate of another region or another year is incorrect. For instance, the electronics industries produce a larger percentage of the output of the California fabricated metals and machinery sector than for the corresponding United States sector. To aggregate industries before weighing their input structures with their outputs would result in input structure distortions.

3/ Current plans of the federal government are to prepare a national input-output table at a minimum of every five years. A table for 1958 is now under construction by the Office of Business Economics, United States Department of Commerce.

TABLE S.3

Example of Computations of Intersector Flows
for Non-agricultural Sectors

Components of petroleum industry aggregate	1947 U. S. petroleum industry purchases of engines per dollar of output		1954 value of California petroleum industry production[b]		Estimated purchases of engines by the petroleum industry in 1954
	1		2		3
	dollars[a]		thousands of dollars		
1. Crude petroleum	.002415	x	1,123,517	=	2,713
2. Petroleum processing	.000749	x	1,675,911	=	1,255
3. Coke and products	.002312	x	9,820	=	23
4. Paving and roofing materials	.000074	x	51,439	=	4
Total inputs of internal combustion engines to the petroleum sector					3,995

a/ Source: Table II of (128).

b/ Source: Estimated from data in (115) and (122).

Because this estimation procedure was standard for the industry to industry flows of sectors UC 11 through 26, it will not be repeated in the individual sector discussions.

The Exogenous Sectors and Final Demand

Flows from the exogenous sectors (rows 27 through 37 in Table I-I) and industry flows to final demand sectors (rows 11 through 26 of columns 27 through 37 in Table I-I) were adapted primarily from the 1947 BLS table. Price inflators, indices of changing consumer preference, and indices of regional preference patterns were employed to adjust these 1947 United States sectors specifically to 1954 California conditions.

UC 1 Meat Animals and Products

Composition

The meat animals and products sector includes cattle and calves kept for meat, hogs, sheep and lambs, and wool and mohair.

UC 1 differs from comparable sectors in the BLS and USDA studies in three respects. First, "other livestock" (horses, mules, honey, beeswax, bees, goats and kids other than for mohair, rabbits, and fur animals and their pelts) are transferred to UC 10 (miscellaneous agriculture). Secondly, cattle and calves kept for dairy purposes are included in UC 3 (farm dairy products). The BLS study aggregated all cattle and calves slaughtered into a single meat animal sector. The UC classification allocates meat produced by the dairy sector to UC 27 (scrap and by-products). Accordingly, slaughtered dairy animals enter as an input into UC 12 (meat and poultry processing) from UC 27. It is argued that any statistical errors involved in making the separation are offset by the clearer picture of the actual structural relationships involved. Finally, there is a difference which does not affect the output structure but is essential in understanding the input structure of the meat animal sector. In the BLS and USDA studies, inputs to pasture were allocated directly to the consuming livestock sector. The production of pasture was considered as an integral part of livestock production. In the California Model, pasture is treated as part of the output of the forage sector and, subsequently, is allocated to the various livestock sectors.

Output and distribution patterns are summarized in Table S.4.

TABLE S.4

Available Supply and Distribution of Meat Animals and Products (UC 1), 1954[a] (thousands of dollars)

	Cattle and calves	Hogs	Sheep and lambs	Wool and mohair	Total
Domestic supply	273,595	23,933	30,285	10,363	336,881
(a) Gross domestic output	273,595	23,933	30,285	9,068	336,881
(b) Inventory depletion				1,295	
Distribution	273,595	23,933	30,285	10,363	336,881
(a) Final demand sectors					
(1) UC 27, Scrap and by-products	147				147
(2) UC 28, Net exports	-164,174	-83,022	-10,975	10,337	-247,834
(3) UC 33, Inventory addition	15,068	4,583	176		18,532
(4) UC 36, Farm households	1,736	1,422	214		3,372
(b) Intermediate sectors					
(1) UC 12, Meat and poultry processing	420,818	100,950	40,870		562,638
(2) UC 21, Other manufacturing				26	26

a/ Net imports are shown as negative net exports. Total inputs are distributed, rather than domestically produced inputs only. (See discussion of sector UC 28).

Output

Cattle and Calves Kept for Meat.--Output is defined as the sum of cash receipts from marketings for slaughter plus the value of home consumption and the value of inventory change. Beginning and ending inventories were compared in terms of numbers of head. The difference was valued at the average price per head, since the distribution of the various classes did not change markedly. Output of farm hides was estimated by assuming their value remained in the same proportion to gross domestic output of the cattle subsector as in the 1947 BLS study.

Hogs.--Output and inventory change are defined as above.

Sheep and Lambs.--Output is defined as above. Separate inventory valuations were available for stock sheep and lambs, and sheep on feed.

Wool and Mohair.--Output is the value of cash receipts. A share of the United States inventory depletion based on California's relative production was added to output to obtain total supply.

Output and inventory data were obtained from (13, 89, 90, and 115). Marketings and end-of-the-year inventory data for the livestock subsectors were adjusted to conform to slaughter and shipment data from (5, 50, and 86). Prices were obtained from (15, 89, and 90).

Distribution

No internal purchases are assigned to the meat animal and product sector, since data on within-state sales of stocker and feeder livestock are not available. Net purchases of stockers and feeders from out-of-state are considered net imports rather than internal purchases.

Sales of UC 1 products to the UC 12 (meat and poultry processing) were obtained by reconciling marketing, inventory, slaughter, and shipment data quoted in (5, 10, 13, 50, 86, 89, 90, and 115).

California wool and mohair consumption of $26,000 was allocated to UC 21 (other manufacturing). Consumption was estimated by assuming the total value of United States wool and mohair consumption was divided among the states in proportion to the number of production workers in each state's wool-consuming industries (115). The balance of California wool and mohair production ($10,337,000) was for export.

The values of livestock consumed on farms (UC 36) were obtained directly from (90) with the exception of the value for cattle and calves. Here, a downward adjustment to exclude the value of dairy cattle consumed on the farm was necessary. Negligible farm slaughter for direct sale occurs; the exact amount is not available.

Net imports of the three meat animal subsectors were estimated directly from shipment data (5, 10, and 50).

UC 2 Poultry and Eggs

Composition

UC 2 includes farm and nonfarm eggs, farm and nonfarm chickens, broilers, turkeys and turkey eggs, other poultry and their eggs, and poultry hatcheries.

Output

Output is cash receipts for chickens, eggs, broilers, and turkeys, plus value of home consumption and value of inventory change, plus value of commercial hatchery production. Data are available in (11, 70, 72, 83, and 94). The value of farm receipts for chickens and eggs was adjusted upward by 5 percent to account for nonfarm production, as suggested in (83). The estimate for the value of ducks, geese, and other miscellaneous poultry and eggs is based on the ratio of numbers raised in 1954 (107) to the number of turkeys raised and their value. Published estimates of value for this miscellaneous class of poultry are not available. A summary of the supply and distribution pattern for UC 2 is presented in Table S.5.

Distribution

Internal purchases of UC 2 include chicken and turkey eggs for hatching and hatchery chicks and poults. Because the hatchery industry is combined with the poultry industry in this sector, part of the output from hatching eggs is double counted; once when they are sold to the hatcheries, and once again when the chicks are sold back to the farmer. Eggs hatched on the farm are counted only once.

Eggs delivered to the processing industries (UC 12 through 15) were estimated on the basis of the proportions of shell eggs used in United States industries as presented in (115). That is, inputs per unit of

TABLE S.5

Available Supply and Distribution of Poultry and Eggs (UC 2), 1954[a/] (thousands of dollars)

	Farm and nonfarm eggs	Farm and nonfarm chickens	Broilers	Turkeys and turkey eggs	Other poultry and eggs	Hatcheries (chicks & poults)	Total
Domestic supply	146,540	17,095	42,070	56,656	3,182	46,995	312,217
(a) Gross domestic output	146,540	16,774	42,070	56,656	3,182	46,995	312,217
(b) Inventory depletion		321					
Distribution	146,540	17,095	42,070	56,656	3,182	46,995	312,217
(a) Final demand sectors							
(1) UC 28, Net exports	- 762	558	809	1,032			1,637
(2) UC 31, Local government							450
(3) UC 33, Inventory addition				334			13
(4) UC 36, Farm households	10,309	2,120	420	177	394		13,420
(5) UC 37, Other households	130,744	11,182	16,281	13,783	2,250		173,790
(b) Intermediate sectors							
(1) UC 2, Poultry and eggs	4,927			5,441		46,995	57,363
(2) UC 12, Meat and poultry proc.	103	3,145	24,163	34,902	538		62,851
(3) UC 13, Dairy products	32						32
(4) UC 14, Canning, preserving, freezing	6						6
(5) UC 15, Misc. agri. processing	1,181	90	397	987			2,655

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

output were derived for the United States, and these technical coefficients were assumed to hold for California processing industries.

Sources (11, 19, and 63) indicate that California was a deficit egg producing state in 1954, although exact net import figures are not available. Both (8) and (63) indicate a deficit of about 4 percent of California production, however, and this value was used. Farm home consumption data are available in (83) and (94). Eggs packed for home consumption were not considered processed but were allocated directly to UC 37 (other households) using per capita consumption data from (73).

Poultry meat was allocated both directly and indirectly to the final demand sectors. Poultry slaughtered in retail or wholesale establishments was distributed directly from UC 2 to households. The remainder was allocated to poultry dressing plants (UC 12) which process the product (i.e., dress, package, and sometimes freeze it) before shipping it to the household sectors. The main source on poultry processing is (115).

Farm households, (UC 36), other households (UC 37), and local government (UC 31) also received poultry as indicated in (51, 73, 83, and 94).

Negligible poultry imports were indicated in (74). Net export figures listed in Table S.5 (derived as a residual), therefore, approximate gross exports.

UC 3 Farm Dairy Products

Composition

UC 3 includes fluid milk, cream, and the by-product, dairy animals slaughtered for meat.

Output and Distribution

Output and distribution estimates for UC 3 are summarized in Table S.6. Output is defined as cash receipts for milk, cream, and meat, plus the value of home consumption, plus the value of inventory change of cattle kept for dairy purposes. Physical output and price data were obtained from (91). A portion of the milk output (about 6 percent) was retailed directly by farmers. The value of this portion of output was adjusted downward to conform to the price of milk sold to plants and dealers. In this case, the farmer was supplying a retail service, the value of which is included in UC 25 (trade and transportation). Milk consumed in the farm household and milk fed to calves were likewise valued at the average price of milk sold to plants and dealers. An upward adjustment of 2 percent of the cash receipts for milk and cream was made to account for nonfarm production as suggested in (123).

TABLE S.6

Available Supply and Distribution of Farm Dairy Products (UC 3), 1954 a/ (thousands of dollars)

	Milk	Cream	Meat	Total
Domestic supply	294,270	1,128	48,145	343,543
(a) Gross domestic output	294,270	1,128	48,145	343,543
(b) Inventory depletion				
Distribution	294,270	1,128	48,145	343,543
(a) Final demand sectors				
(1) UC 27, Scrap and by-products			45,357	45,357
(2) UC 33, Inventory additions			2,044	2,044
(3) UC 36, Farm households	9,252		744	9,996
(b) Intermediate sectors				
(1) UC 3, Farm dairy products	9,325			9,325
(2) UC 13, Dairy products	275,693	1,128		276,821

a/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

Except for farm home consumption and milk fed to calves, all milk and cream were allocated to dairy products processing (UC 13). Milk was routed to processing rather than directly to the consumer (as was done with part of poultry and with fresh fruits and vegetables) because the nature of the product is significantly altered by pasteurizing. That is, unpasteurized milk and pasteurized milk are different products for which different demands exist. In addition, most pasteurizing and processing plants are combined in one unit. Thus, a more realistic input structure is obtained by combining fluid milk and other processed dairy products than would occur if fluid milk were allocated directly to the consumer.1/

Dairy animals sold for meat were allocated to the by-products sector. Their numbers were derived as follows: Beginning and ending inventories of diary cattle, separated by age groups, were compared (89). Dairy cattle imports and exports are available in incomplete form in (10) and(50). The difference between the number of calves less than a year old at the beginning of 1954, and the number of heifers from one to two years old at the end of 1954 showed the number of heifers that died or were culled. Further dairy animals are not usually culled until after calving (at age two or older). Since data in (90) suggest that diary calf deaths were as large as the disappearance figure derived, it was assumed that all calf and heifer disappearance was from death. The end of the year number of dairy animals two years or older, when compared with the beginning of the year number of heifers between one and two years, indicated the number of cows that died or were culled. The number that died was given in (90), so the number available for slaughter could be determined by subtraction, after adjusting for imports and exports.

As with sector UC 1 (meat animals and products), internal purchases and sales of animals were ignored for lack of data. Net purchases of dairy animals from out-of-state were distributed from UC 28 (net imports).

UC 4 Food and Feed Grains

Composition

The food and feed grain sector includes wheat, rye, rice, corn for grain, barley, oats, grain sorghum for grain, corn for silage and forage, and grain sorghum for silage and forage.

1/ The BLS and USDA studies chose the opposite procedure. Fluid milk was distributed directly from the farm sector to final demand.

Output and Distribution

The output and distribution pattern for UC 4 is shown in Table S.7. All outputs and inventories were obtained in physical units from (8). Import and export data are available in (35). The physical data were converted to value data, using prices from (8), after all distributions had been made.

The total amounts of each grain used in all California processing industries, as well as the total distribution of each grain to each United States processing industry, were obtained from (115). Each grain was distributed between UC 11 (grain mill products) and UC 15 (miscellaneous agricultural processing) relative to the value of shipments or number of production workers in California as compared with the United States for each industry. Other fragmentary data from (115), and complete barley distribution data from (8) were used as a check. A small amount of grain was reallocated from UC 15 (miscellaneous agricultural processing) to UC 16 (chemicals and fertilizers) on the basis of flow data from (29).

The following procedure was used to distribute the balance of the available grain supply to UC 1, UC 2, UC 3, and UC 10. Tentative use estimates were made for each livestock class (sheep, hogs, beef, horses, etc.) by adjusting Jennings' estimates (43, 44) to 1954 by ratios of livestock numbers. It was assumed that each sector used total grains in the same relative amounts as in the adjusted Jennings' estimate. The control total for each sector was adjusted to 130 percent of the adjusted Jennings' total to absorb the extra available feed. Feeds that were in excess were distributed among the various using sectors in proportion to both the relative excess supply of each grain and the relative deficit to be made up in each sector. More confidence is placed in the aggregate amounts of grain fed to each sector than in the amount of a particular kind of grain fed in a sector.

UC 5 Cotton

Composition

The cotton sector includes cotton lint and cotton seed. It excludes cotton linters which are a by-product of the oil mill industry (included in UC 16, chemicals and fertilizers).

Output and Distribution

A summary of the UC 5 output and distribution pattern is presented in Table S.8. Output is California production valued at the average price received by California farmers in 1954. Sources for cotton lint production,

TABLE S.7

Available Supply and Distribution of Food and Feed Grains (UC 4), 1954.[a] (thousands of dollars)

	Corn	Barley	Oats	Sorghum	Silage & forage (corn & sorghum)	Wheat	Rye	Rice	Total
Domestic supply	15,894	84,413	5,851	10,847	5,400	20,397	164	56,076	197,729
(a) Gross domestic output	15,837	84,413	5,694	10,847	5,400	19,338	124	56,076	197,729
(b) Inventory depletion	57		157			1,059	40		
Distribution	15,894	84,413	5,851	10,847	5,400	20,397	164	56,076	197,729
(a) Final demand sectors									
(1) UC 28, Net exports	- 5,191	13,292		- 13,090		-20,395			- 25,384
(2) UC 33, Inventory addition		19,942		890				6,850	26,369
(b) Intermediate sectors									
(1) UC 1, Meat animals	18	9,169	1,081	1,064	3,009	1,448			15,789
(2) UC 2, Poultry and eggs	242	13,512		5,622		6,877	11		26,264
(3) UC 3, Farm dairy products		4,924	213	323	2,391	437			8,288
(4) UC 4, Food & feed grains	64	3,485	1,117	28		1,338	21	3,255	9,308
(5) UC 10, Misc. agriculture		275	44	28		38			385
(6) UC 11, Grain mill products	20,374	16,842	3,396	15,982		30,654	72	45,971	133,191
(7) UC 15, Misc. agri. proc.	387	2,972					60		3,419
(8) UC 16, Chemicals and fertilizers									100[b]

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ Individually distributed through UC 15.

TABLE S.8

Available Supply and Distribution of Cotton and Cottonseed (UC 5), 1954[a/] (thousands of dollars)

	Cotton	Cotton-seed	Total
Domestic supply	247,684	36,645	284,329
(a) Gross domestic output	247,684	36,645	284,329
(b) Inventory depletion			
Distribution	247,684	36,645	284,329
(a) Final demand sectors			
(1) UC 27, Scrap & by-products		35,561	35,561
(2) UC 28, Net exports	227,897		227,897
(3) UC 33, Inventory addition	18,670		18,670
(b) Intermediate sectors			
(1) UC 5, Cotton		1,084	1,084
(2) UC 21, Other manufacturing	1,117		1,117

a/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

value, and inventories include (52, 70, 111, and 112). California's inventory addition was assumed to be proportional to its production relative to total United States production. The number of bales of raw cotton used in California industry is recorded in (115). Exports out of the state were derived as the difference between production and consumption.

Cottonseed production, sales, amount used for seed, and value are listed in (87). Cottonseed inventories are listed in (111). All seed not used for planting was distributed to UC 25 (scrap and by-products).

UC 6 Vegetables

Composition

Sector UC 6 includes four classes of vegetables and truck crops: (1) miscellaneous vegetables, including strawberries, tomatoes, and sweet corn, as well as other vegetables; (2) melons; (3) potatoes, including sweet potatoes; and (4) dry beans and peas.

Output

Output for vegetables and melons is the value of commercial output grown in California as given in (12) plus a 3 percent adjustment for noncommercial output as suggested in (107). Values on crops for the fresh market are based on average prices paid for product packed and loaded at an f.o.b. position. This method of selling predominates in the California vegetable and melon industry and thus is the "producers' price." Packing, as well as harvesting costs, are included. Values on processing output are at roadside. Onion inventories are recorded in (95). No other vegetable inventory data were available.

Potato, and dry bean and pea outputs by value are given in (8) and (93). Corresponding inventory information is available in (93).

Outputs and distributions for these four subsectors are summarized in Table S.9.

Distribution

Vegetables.--Adequate distribution data are available on approximately 94 percent of the commercial vegetables by value. Amounts and values of California vegetables processed and shipped fresh are in (12). Import and export data are available in (7, 16, 17, and 18).

Fresh vegetables not exported were divided between federal government and other households, using United States per capita consumption figures

TABLE S.9

Available Supply and Distribution of Vegetables (UC 6), 1954.[a] (thousands of dollars)

	Miscellaneous vegetables	Melons	Potatoes (including sweet)	Dry beans and peas	Total
Domestic supply	344,437	34,518	78,922	41,534	495,411
(a) Gross domestic output	344,314	34,518	67,473	41,534	487,839
(b) Inventory depletion	123		7,449		7,572
Distribution	344,437	34,518	74,922	41,534	495,411
(a) Final demand sectors					
(1) UC 27, Scrap and by-products			1,724		1,724
(2) UC 28, Net export	126,744	20,053	- 5,490		141,307
(3) UC 31, State and local government				-	529[b]
(4) UC 36, Farm households	10,029	1,004	80		11,113
(5) UC 37, Other households	120,454	13,461	39,419		172,805
(b) Intermediate sectors					
(1) UC 6, Vegetables			5,560	2	5,562
(2) UC 14, Canning, preserving, freezing	87,210		25,894	41,532	154,636
(3) UC 15, Miscellaneous agricultural processing			7,735		7,735

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ Individually distributed through UC 37.

from (73). The method was as follows: Two equations were solved simultaneously with the conditions that (1) the sum of civilian plus military consumption equaled the total available supply and (2) military per capita consumption remained in the same proportion to civilian per capita consumption as for the United States. While both military and civilian per capita consumption of fresh vegetables were higher in California than the United States average, due to higher average incomes and closer proximity to the source of the supply, the particular over-all relation of military per capita consumption being higher or lower than civilian consumption was maintained. That amount allocated to the federal government was reallocated to net exports (UC 28) as explained in the discussion of UC 32.

Where the amount of a vegetable used for processing could not be estimated either from government publications such as (12, 95, and 96) or from industry publications (135), domestic fresh consumption was estimated using per capita consumption data. The difference between domestic consumption and domestic fresh consumption was assigned to processing industry UC 14.

Inadequate data to make individual commodity distributions are available on 6 percent of the value of output of sector UC 6. This 6 percent was tentatively distributed in proportion to the average distribution of the other 94 percent. Downward adjustments of the export and processing allocations and an upward adjustment of the other household allocations were then made on the basis of fragmentary domestic use data in (16, 17, and 18).

The 3 percent upward adjustment in gross domestic output to allow for noncommercial production (e.g., vegetables grown in gardens) was allocated to the farm household sector (UC 36). This sector includes all agricultural production consumed by the producer whether the producer is a "farm household" or an "urban household with a garden."

Melons.--Individual distributions were made for cantaloupes, persian, honeydew, and miscellaneous melons. All production was either distributed directly to the two household sectors or exported. Input and export data are in (7, 16, 17, and 18). Federal government and other household estimates were made with per capita consumption data from (73). The estimate for federal government consumption was allocated to net exports (UC 28). Farm households (UC 36) received the 3 percent adjustment of the value of commercial output made as an estimate of noncommercial production.

Potatoes.--Potato and sweet potato import and export estimates were also developed from (7, 16, 17, and 18). Distributions for on-farm consumption (UC 36), potatoes used for seed (UC 6), and potatoes fed to livestock

(UC 27, scrap and by-products) were made from data in (93). No California data are available on fresh consumption versus processing. The residual was divided between these two uses with consumption data from (73). The processing portion was then divided between UC 14 (canning, preserving, and freezing) and UC 15 (miscellaneous agricultural processing), using percentages obtained from (45).

Dry Beans and Peas.--All dry beans and peas were allocated to canning, preserving, and freezing (UC 14) with the exception of the amount used for seed, quoted in (8). Inventory addition was negligible.

UC 7 Fruits and Tree Nuts (Excluding Citrus)

Composition

UC 7 is composed of five subsectors, two of which are distributed as individual crops. The subsectors and included crops are as follows: (1) Deciduous fruits--including apples, apricots, sweet cherries, nectarines, peaches, pears, persimmons, prunes, plums, and pomegranates; (2) Semi-tropical noncitrus--including avocados, dates, figs, and olives; (3) Grapes; (4) Tree nuts; and (5) Bushberries not specified by kind--include blackberries, boysenberries, youngberries, loganberries, and raspberries.

Output

Output is defined as cash receipts from the sale of fruit and nuts, plus the value of home consumption, and the value of inventory change. Output data are available in (9) for tree fruits and nuts. Inventories for apples and pears are in (14). Berry information is presented in (6), with fragmentary distribution data in various cooperative shipping association publications.

The supply and distribution pattern for each crop and subsector is presented in Table S.10.

Distribution

Production, exports, farm home use, domestic fresh use, and processing data are presented in (9) for the majority of California tree fruits. Import estimates were derived from (14, 16, 17, and 18). The still unallocated residual was divided between other households (UC 37) and the federal government (UC 32) with per capita consumption data as described for vegetables. Where distribution data on several minor fruits were incomplete, allocations were made in proportion to a similar major fruit.

TABLE S.10

Available Supply and Distribution of Fruit and Nuts (UC 7), 1954.[a/] (thousands of dollars)

	Apples	Apricots	Cherries (sweet)	Nectarines	Peaches	Pears	Persimmons	Plums	Prunes	Pomegranates	Total deciduous
Domestic supply	14,790	16,660	7,795	2,406	41,441	30,036	267	9,380	37,866	175	160,816
(a) Gross domestic output	14,790	16,660	7,795	2,406	41,441	30,036	267	9,380	37,866	175	160,816
(b) Inventory depletion											
Distribution	14,790	16,660	7,795	2,406	41,441	30,036	267	9,380	37,866	175	160,816
(a) Final demand sectors											
(1) UC 28, Net exports	-5,525	1,018	2,859	1,829	4,225	6,288	99	7,459		142	18,394
(2) UC 31, State and local govt.											
(3) UC 33, Inventory addition	615					43					658
(4) UC 36, Farm households	171	202	101	26	190	90	3	42	43	1	869
(5) UC 37, Other households	11,465	897	1,131	461	4,904	2,730	165	1,773		32	23,558
(b) Intermediate sectors											
(1) UC 14, Canning, preserving, freezing	8,064	14,543	3,704	90	32,122	20,885		106	37,823		117,337
(2) UC 15, Misc. agri. processing											
(3) UC 16, Chemicals and fertilizers											

(Continued on next page.)

Table S.10 continued.

	Avo-cados	Dates	Figs	Olives	Total semi-tropical	Grapes	Tree nuts	Bush-berries	Total fruit and nuts
Domestic supply	7,881	1,448	5,435	8,300	23,064	106,839	45,809	3,114	339,642
(a) Gross domestic output	7,881	1,448	5,435	8,300	23,064	106,839	45,809	3,114	339,642
(b) Inventory depletion									
Distribution	7,881	1,448	5,435	8,300	23,064	106,839	45,809	3,114	339,642
(a) Final demand sectors									
(1) UC 28, Net exports	1,418		84	94	1,596	29,415		361	49,766
(2) UC 31, State and local govt.									528[b]
(3) UC 33, Inventory addition									658
(4) UC 36, Farm households	104	2	12		118	124	245	6	1,362
(5) UC 37, Other households	6,359		272	8	6,639	3,931		346	33,946
(b) Intermediate sectors									
(1) UC 14, Canning, preserving, freezing		1,446	5,067	8,198	14,711	73,369		2,401	207,818
(2) UC 15, Misc. agri. processing							45,384		45,384
(3) UC 16, Chemicals & fertilizers							180		180

a/ Net imports are shown as negative exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ Individually distributed through UC 37.

With the exception of home produced consumption, tree nut output was allocated to processing industries UC 15 and UC 16. Oil mill purchases (UC 16) are recorded in (9). The balance of the crop was distributed to miscellaneous agricultural processing (UC 15). It is argued that the amount of processing involved is enough to warrant distributing nuts through UC 15, rather than distributing them directly to final demand, even though much of the crop is sold in bulk. Also, since shelled and unshelled nuts are handled in the same plants, input allocation problems are avoided while a more realistic industry input structure is obtained.

The bushberry distribution was made with fragmentary data from (6) combined with unload and shipment data from (14, 16, 17, and 18).

UC 8 Citrus

Composition

UC 8 includes oranges, tangerines, satsumas, grapefruit, lemons and limes.

Output and Distribution

The output and distribution pattern is summarized in Table S.11. Gross domestic output is defined as the value of sales plus the value of home consumption.

Fresh fruit, not consumed on the farm nor allocated to UC 14 for processing into products such as juice or frozen concentrate, is distributed directly to the final demand sectors. Output, inventories, and amounts used in processing are available in (3, 14, 16, 17, and 18). Government purchases of citrus were obtained from (3). The allocation to UC 37 (other households) was the residual. The basic prices used to convert the physical output distributions to value distributions are in (85). These prices were adjusted from an f.o.b. packing house basis to an on-farm basis, using cost of production estimates quoted in various county agricultural extension mimeos. Fruit sold fresh and fruit sold for processing were valued at different prices. Because of the differences in price between the different uses, California was a net importer of grapefruit in physical units, but a net exporter in terms of value. Arizona citrus processed in California plants caused the apparent discrepancy.

UC 9 Forage Crops

Composition

Hay and pasture compose sector UC 9. Corn and sorghumused for forage or silage are excluded from UC 9 and included in UC 4 because of the nature

TABLE S.11

Available Supply and Distribution of Citrus (UC 8), 1954.[a] (thousands of dollars)

	Oranges, tangerines, etc.	Grape-fruit	Lemons	Limes	Total
Domestic supply	90,061	4,222	42,637	97	137,017
(a) Gross domestic output	90,061	4,222	42,637	97	137,017
(b) Inventory depletion					
Distribution	90,061	4,222	42,637	97	137,017
(a) Final demand sectors					
(1) UC 28, Net exports	76,859	422	31,382	- 60	108,603
(2) UC 31, State and local government					25[b]
(3) UC 36, Farm households	748	48	61		857
(4) UC 37, Other households	6,607	3,577	3,774	157	14,090
(b) Intermediate sectors					
(1) UC 8, Citrus		2			2
(2) UC 14, Canning, preserving, freezing	5,847	173	7,420		13,440

a/ Net imports are shown as negative exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ Individually distributed through UC 37.

of their inputs. Pasture is defined as an independent enterprise rather than as an integral part of livestock production, as in the 1947 BLS and 1955 USDA studies (51, 125, and 128).

Output and Distribution

Output and distribution of UC 9 are summarized in Table S.12. Output and inventory change of hay in tons were determined from (8). Domestic output was augmented by imports and distributed to the livestock sectors (UC 1, UC 3, and UC 10), as outlined in (53). The allocation of alfalfa to feed mills (UC 11) was the residual. Data in (104) for earlier years provided a check on the feed mill allocation. Dollar values were obtained by applying the average weighted price for all hay to that hay allocated to the livestock sectors, and the average price of alfalfa hay to that allocated to grain mills. Prices are given in (8).

The valuation of pasture output presented difficulties. Initially, output was estimated by converting pasture acreages, classified by type in (102) to feed units,[1/] using conversion factors developed from Jennings (44). A dollar value was obtained by multiplying estimated feed units times the 1954 farm price of one ton of corn. The distributions to UC 1, UC 3, and UC 10 were made by adjusting Jennings' distributions (44) to 1954 with ratios of livestock numbers.

With this value placed on pasture output, however, total gross outlay by the meat animal and product sector (UC 1) was 1.25 times as large as its gross output. In addition, household inputs to the pasture subsector appeared large in relation to other crop sectors. The effect was to attribute large profits to the pasture subsector and negative profits to the meat animal sector.

The solution to this problem was to estimate household inputs to pasture independently, instead of treating them as the difference between the value of output and the cost of other inputs. Gross domestic output was valued as the total value of inputs including household inputs.[2/] The input structures of the livestock sectors now appeared satisfactory in the light of various

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1/ A feed unit is defined as equal to the equivalent nutritive value of one ton of corn.

2/ Only two subsectors were valued in this manner--pasture, and horses and mules. All other sectors' products have a widely recognized market value and may be valued directly. Where the direct method is possible, it is preferable. The household input is difficult to estimate and is, in fact, a function of the total value of output since the difference between costs and output is profit. For these two sectors, however, "normal" profits were imputed.

TABLE S.12

Available Supply and Distribution of Forage (UC 9), 1954[a/] (thousands of dollars)

	Hay	Pasture	Total
Domestic supply	134,518	48,705	183,223
(a) Gross domestic output	132,498	48,705	181,203
(b) Inventory depletion	2,020		2,020
Distribution	134,518	48,705	183,223
(a) Final demand sectors			
(1) UC 28, Net exports	- 2,958		- 2,958
(b) Intermediate sectors			
(1) UC 1, Meat animals	57,999	33,017	91,016
(2) UC 3, Farm dairy products	66,667	14,704	81,371
(3) UC 10, Miscellaneous agriculture	6,078	984	7,062
(4) UC 11, Grain mill products	6,732		6,732

a/ Net imports are shown as a negative export. Total inputs are distributed rather than domestically produced inputs only. (see discussion of sector UC 28.)

farm enterprise cost of production studies, as well as the USDA and BLS aggregate models (34 and 51).

UC 10 Miscellaneous Agriculture

Composition

UC 10 is composed of the following subsectors: (1) Legume and grass seed; (2) Vegetable seed, greenhouse and nursery products; (3) On-farm forest products; (4) Sugar beets; (5) Oil crops--including castor beans, flaxseed, peanuts, safflower seed, and soybeans; (6) Miscellaneous crops--including hops, broomcorn, sugar beet seed, sunflower seed, sesame seed, mustard seed, and hemp seed; (7) Honey and beeswax; (8) On-farm horse and mule power, and horse and mule slaughter; (9) Agricultural services--including custom work and machinery hire, soil testing, seed certification, cotton ginning, artificial insemination, and animal husbandry services; and (10) Fishing.

Output and Distribution

Outputs for all crop subsectors and the honey and beeswax subsector are defined as gross output valued at market price. Agricultural service output is the market value of services rendered. Output for horses and mules are assumed equal to the value of all inputs into that subsector. A summary of the supply and distribution pattern for each subsector is presented in Table S.13.

Legume and Grass Seed.--Output data on alfalfa seed and the major clover and grass seeds are in (8). The minor clover and grass seeds produced in California are listed in the Census (107).

Alfalfa seed inventories and net exports for the United States were obtained from (70) and (106) to establish total United States consumption. California inventory depletion was assumed proportional to total United States inventory depletion and relative outputs. California consumption of alfalfa seed was based on the numbers of acres planted for both seed

TABLE S.13

Available Supply and Distribution of Miscellaneous Agriculture (UC 10), 1954.[a] (thousands of dollars)

	Legumes, grass seed	Veg. seed, green-house, nursery	Forest prod.	Sugar beets	Oil crops	Misc. crops	Horses and mules	Agricul-tural services	Fishing	Honey and bees-wax	Total misc. agri.
Domestic supply	24,233	63,467	4,020	50,489	4,938	5,280	10,660	59,876	67,403	4,566	294,778
(a) Gross domestic output	24,133	63,467	4,020	50,489	4,938	5,280	10,660	59,876	67,403	4,512	294,778
(b) Inventory depletion	100									54	
Distribution	24,233	63,467	4,020	50,489	4,938	5,280	10,660	59,876	67,403	4,566	294,778
(a) Final demand sectors											
(1) UC 28, Net exports	17,374	21,944				2,996				2,300	44,614
(2) UC 33, Inventory addition				3,786	310	118					4,060
(3) UC 37, Other households	190	27,978	1,150							1,780	31,098
(b) Intermediate sectors											
(1) UC 1, Meat animals							107				107
(2) UC 3, Farm dairy products							85	1,891			1,976
(3) UC 4, Food and feed grains	143						2,305	5,661			8,109
(4) UC 5, Cotton							531	28,408			28,939
(5) UC 6, Vegetables		5,539					1,635	9,032			16,206
(6) UC 7, Fruit and nuts		3,820					3,037	6,403			13,260
(7) UC 8, Citrus		1,642					350	1,515			3,507
(8) UC 9, Forage	6,145						1,986	2,260			10,391
(9) UC 10, Miscellaneous agriculture	381	1,931			176	303	584	4,706			8,081
(10) UC 14, Canning, etc.		613				58			67,403		68,074
(11) UC 15, Misc. agri. processing				46,703		1,714				203	48,620
(12) UC 16, Chemicals and fertilizers					4,452					283	4,735
(13) UC 21, Other manufacturing			2,870			91					2,961
(14) UC 27, Scrap and by-products							40				40

a/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

and forage relative to total United States acreage. Exports were the residual between consumption and production.

Clover and grass seeds were distributed together relative to acreages of cropland used for pasture and for seed production in California and the United States. Cover crop seeds were distributed to the grain sector, again on the basis of relative acreage in California and in the United States. Sources for acreage, United States imports and exports, and values were (70, 102, and 107). Net exports, computed as the residual, were negligible.

Vegetable Seeds, Greenhouse, and Nursery Products.--This subsector was handled as three separate components, as follows:

1. Cutflowers, potted plants, forest greens, and bedding plants. Output and information on California exports are in (54) and (107). All output was distributed either to UC 28 (net exports) or to UC 37 (other households).

2. Vegetables grown under glass, flower seed, vegetable seed, vegetable plants, bulbs, and mushrooms. Total output was obtained from (107). The County Agricultural Commissioners' reports (4) were examined to separate total output into value of output for vegetable seed, flower seed, vegetable plants, bulbs, mushrooms, and vegetables under glass. Vegetable seed and vegetable plants were distributed to UC (vegetables). Flower seed was returned to UC 10 (miscellaneous agriculture). Mushrooms were allocated to UC 15 (miscellaneous agricultural processing), while bulbs and vegetables under glass were allocated directly to UC 37 (other households). Information on California's imports and exports was not available. Ratios of California and United States vegetable and vegetable seed acreages, however, suggest that California was neither a net exporter nor a net importer. Because exports, if any, appear only in the exogenous sector of the model and do not affect the technical coefficients, and since net imports, if any, were small, this lack of exact information is not important. The entire component comprises only 3.5 percent of the sector.

3. Nursery products, trees, shrubs, vines, and ornamental horticulture. Total output is available in (107) and output by product class in (92). It was assumed that California had no net imports or exports. Distributions to UC 8 (citrus), UC 7 (fruit and nuts), and UC 37 (other households) were based values of output by type of product as listed in (92). Where the product classification did not exactly correspond to the UC sector classification, adjustments were made with ratios of nonbearing acreages.

On-Farm Forest Products.--That output which was not sold as firewood (107) to UC 37 (other households) was allocated to UC 21 (other manufacturing).

Sugar Beets.--Sugar beets are California's only sugar crop. Output data for California and the United States are in (8). The Census of Manufacturers (115) lists tons of beets used in United States manufacturing. The difference between United States production and United States consumption was assumed to be inventory addition, since the United States does not export unprocessed beets (8). California's inventory addition was assumed proportional to its share of United States production. All output other than that for inventory addition (UC 33) was allocated to UC 15 (miscellaneous agricultural processing).

Oil Crops.--Outputs of California oil crops are listed in (107). Flaxseed stocks are recorded in (70). Other oil seeds stock data are not available. Since total output of oil seeds is small, stocks were assumed to be negligible. California oil mill output, listed in (115), appeared large enough to process all of California's oil seed output. Thus, except for small quantities allocated to UC 10 (miscellaneous agriculture) for seed (46), output was distributed to UC 16 (chemicals and fertilizers).

Miscellaneous crops.--These crops were valued and distributed with information from (8, 68, 70, 107, and 115). Except for hops, all are of minor importance and their output is absorbed by California's processing industries. Net exports of hops amounted to $2,996,000.

Honey and Beeswax.--Production, value, and stocks are listed in (5). Inputs to UC 15 (miscellaneous agricultural processing) were obtained from (115). All beeswax was allocated to UC 16 (chemicals and fertilizers). Household and federal government purchases were derived from population and consumption data (73). The residual was assigned to UC 28 (net exports). Federal government purchases were reallocated to UC 28.

On-farm Horse and Mule Output.--Output was valued as equal to total calculated inputs to the horse and mule subsector, in a similar fashion to the procedure followed for pasture. Carter (28) valued horse and mule inputs for the Pacific states. This value was scaled down for California with ratios of horse and mule numbers (89). Distribution of these services was made relative to the number of tractor hours used by each sector (28). In addition to the service outputs, 40 percent of the value of 1954 inventory depletion of horses and mules was assigned to UC 27 (scrap and by-products) for further transfer to the animal scrap industries (included in UC 16) (103).

Agricultural Services.--The value of output and distribution of agricultural services for the United States was obtained from (98). These values were scaled down for California on the basis of relative acreage (for seed certification, soil testing, and custom work and machinery hire), relative value output (for farm management services and for custom work in the forest product and greenhouse industries), relative numbers (for artificial insemination), and relative number of bales (for cotton ginning). Although the estimates in (98) were for the year 1955, it was assumed the value of agricultural services did not differ significantly from 1954.

The input structure of the agricultural service subsector was also estimated from information in (98). A detailed breakdown on inputs into each type of agricultural service for the United States was presented. These inputs were adjusted according to California's output of each type of service relative to that of the United States.

Fisheries.--Value of output for California fisheries is available in (114). The entire output was distributed to UC 14 (canning, preserving, and freezing). Since small quantities of fish are sold fresh, without packaging or other processing, inputs to UC 14 are somewhat enlarged. The exact amount of these direct sales is not available.

UC 11 Grain Mill Products

Composition

This sector is defined on an establishment basis and is identical with Census industries 2041-45.[1/] Components of UC 11 and their corresponding outputs are presented in Table S.14.

1/ The Census industry number refers to the Standard Industrial Classification (SIC) system of the United States Department of Commerce. See (115) for full definitions.

Table S.14

Gross Output, Primary Industry Production, and Transfers-In for UC 11, 1954. (thousands of dollars)

	Gross Output	Production of the Primary Industry	Domestic Transfers-in
Grain mill products	403,698	391,923	11,775
Flour and meal		52,025	
Prepared feeds		238,455	
Cereal breakfast foods		15,040	
Rice milling		67,310	
Blended and prepared flour		19,093	

Output

Output is defined as the value of production of the industries for which the products listed in Table S.14 are considered primary production, plus the value of these products which are produced in other industries and are transferred to UC 11 sector for distribution. The value of California output was estimated as follows:

1. Value of shipments, listed in (115), were recorded for both the United States and California. Where a California figure was not listed separately from a regional figure, the value of California shipments was estimated by assuming shipments were proportional to employment.

2. The value of the change in manufacturer's inventories of finished products for the United States was recorded for each industry. California's share of inventory change was assumed to be in the same proportion to California shipments as United States inventory change was to United States shipments.

3. California's value of shipments was adjusted by inventory change to convert it to value of output.

4. Domestic transfers-in were assumed to be in the same proportion to United States transfers-in as California shipments were to United States shipments for the industry from which the transfers-in came.

5. Production of the primary industry plus domestic transfers-in equals gross domestic output.

6. Transfers-out of secondary products produced by the grain mill products sector were also estimated as proportional to United States transfers-out.

7. As a check, total shipments by product class were recorded and aggregated. The following equation was then solved by an iterative procedure, working from the most "firm" to the least "firm" estimate.

Output of the primary industry + transfers-in = gross domestic output = total shipments by product class of grain mill products + transfers-out + inventory change of the primary industry.

Distribution of Prepared Feeds to the Agricultural Sectors.

The available supply and distribution of all products of UC 11 is summarized in Table S.15. Distribution to nonagricultural sectors was accomplished as described on page 6. Explanation of the distribution to agricultural sectors follows.

In distributing unprocessed grains from UC 4, it was found that the grain available for livestock and poultry feed was approximately 130 percent greater than Jennings' estimates (43) adjusted to 1954 by ratios of livestock numbers. Therefore, Jennings' distributions of formula feeds, adjusted to 1954 by ratios of livestock numbers were adjusted downward. As a first approximation, formula feeds inputs were adjusted downward assuming a pound for pound substitution rate. The various classes of prepared feeds were valued using average producers' prices derived from (115).

Technical coefficients for the sum of inputs from sectors UC 4 and UC 11 were computed for sectors UC 1, UC 2, and UC 3 and compared with coefficients from the 1955 USDA study. The coefficients for poultry (UC 2), where no problems of forage-grain substitution occur, were 0.58 for the United States and 0.56 for California (i.e., total direct inputs of processed and unprocessed grains to the California poultry sector were 56 cents per dollar of output). This difference could be due to different proportions of poultry products between California and the United States, errors of allocation, or actual technical efficiencies. The close correspondence of two coefficients, however, gives credibleness to each other.

A completely accurate check of California grain inputs against the United States estimates was impossible for UC 1 and UC 2, since forage

TABLE S.15

Available Supply and Distribution of the Agricultural Processing Sectors, 1954.[a] (thousands of dollars)

	UC 11	UC 12	UC 13	UC 14	UC 15
Domestic supply	403,698	1,028,435	571,686	1,221,341	1,727,143
(a) Gross domestic output	403,698	1,026,189	570,629	1,221,341	1,727,143
(b) Inventory depletion		2,246	1,057		
Distribution	403,698	1,028,435	571,686	1,221,341	1,727,143
(a) Final demand sectors					
(1) UC 27, Scrap and by-products	1,057	33,163		314	4,587
(2) UC 28, Net exports	- 43,653	- 190,940	- 95,350	826,736	- 178,535
(3) UC 30, New construction					322
(4) UC 31, Local government	216	4,392	2,263	1,048	2,097
(5) UC 33, Inventory addition	433			18,983	5,692
(6) UC 37, Other households	128,890	947,391	506,845	286,674	1,136,522
(b) Intermediate sectors					
(1) UC 1, Meat animals and products	17,366				
(2) UC 2, Poultry and eggs	118,766				
(3) UC 3, Farm dairy products	34,343				
(4) UC 10, Miscellaneous agriculture	138	500			1,104
(5) UC 11, Grain mill products	27,741	2,406	1,118	1,067	13,932
(6) UC 12, Meat and poultry processing	277	51,016	992	2,217	5,633
(7) UC 13, Dairy products	198	1,941	55,717	1,014	24,342
(8) UC 14, Canning, preserving, freezing	9,418	17,200	1,080	19,614	105,591
(9) UC 15, Misc. agri. processing	92,816	26,682	15,824	11,254	343,626
(10) UC 16, Chemicals and fertilizers	2,343	19,934	641	932	16,654
(11) UC 17, Petroleum		7			2
(12) UC 18, Fabricated metals and mach.	5				15
(13) UC 20, Primary metals	158				5
(14) UC 21, Other manufacturing		2,306	429		1,854
(15) UC 23, Utilities	5	688	417	263	712
(16) UC 24, Selected services	11,513	92,207	70,824	46,308	207,112
(17) UC 25, Trade and transportation	602	2,049	4,623	704	23,793
(18) UC 26, Unallocated services	1,066	17,493	6,263	4,213	12,083

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

much larger proportion of the ration for these sectors in the West than in the United States as a whole. Too, forage valuation is rather arbitrary, and the forage sector is defined somewhat differently in the 1955 USDA agriculture input study (51) than in the UC model. However, fragmentary data on aggregate feed use (44, 53, 81, and 129) and data derived from various county cost of production studies indicated the tentative estimates were somewhat low for the livestock sectors. Accordingly, small upward adjustments were made. The procedure used involved balancing rough estimates of available processed feeds against numbers of livestock fed, and estimates of average amounts fed per head.

UC 12 Meat and Poultry Processing

Composition, Output, and Distribution

The meat and poultry processing sector has three main components, generally comparable to Census industries 2011 (meat packing), 2013 (prepared meats), and 2015 (poultry dressing plants) (115).

Output for these three components was derived from data in (115) as described for UC 11. Components of gross output are presented in Table S.16.

Table S.16

Gross Output, Primary Industry Production, and Transfers-In for UC 12, 1954. (thousands of dollars)

	Gross Output	Production of the Primary Industry	Domestic Transfers-In
Meat and Poultry Processing	1,026,189	1,019,661	6,528
Meat packing		693,251	1,356
Adjustment for slaughter in wholesale branches		55,802	
Prepared meats		147,001	1,787
Prepared meats processed in wholesale branches		13,823	
Poultry dressing plants		109,784	3,385

An adjustment for prepared meats manufactured in manufacturer's wholesale branches was available in (115). Inventory change on this portion of production was ignored. An additional adjustment to include an estimated amount for slaughter by wholesale and retail trade was obtained by deducting an adjusted Census estimate of manufacturing slaughter from the USDA's estimate of total slaughter (86). The Census estimate of liveweight slaughtered was adjusted downward to conform to the USDA's estimates of average weight per head since the average weights inferred in the Census were unrealistic. Census numbers slaughtered were assumed correct. The difference between total slaughter and manufacturing plant slaughter was valued using wholesale price information in (77).

The poultry dressing plant component is identical with Census industry 2015 and includes only that poultry slaughtered, dressed, and packed by recognized manufacturing establishments. The balance of dressed poultry (slaughtered in wholesale or retail establishments) was considered as unprocessed and allocated directly to final demand from UC 2 (poultry and eggs).

The available supply and distribution pattern for UC 12 is summarized in Table S.15. Output of UC 12 is not purchased by agricultural sectors. Distribution to nonagricultural sectors was accomplished as described on page 6.

UC 13 Dairy Products

Composition, Output, and Distribution

The dairy products sector is defined on an establishment basis identical to Census industries 2021-25 (115). Components of UC 13 and their corresponding outputs are presented in Table S.17.

The dairy products sector differs from the comparable BLS sector EM-22 in that UC 13 includes all fluid milk and cream not consumed on the farm where produced. This procedure, in contrast to allocating fluid milk and cream from the farm directly to households, was selected since the level of processing is sufficient to warrant the inclusion of fluid milk in the processing sector. Too, this procedure avoids the necessity of arbitrary adjustments in

Table S.17

Gross Output, Primary Industry Production, and Transfers-In for UC 13, 1954. (thousands of dollars)

	Gross Output	Production of the Primary Industry	Domestic Transfers-In
Dairy products industry	570,629	567,339	3,290
Creamery butter		27,367	
Natural cheese		13,904	
Concentrated milk		69,478	
Ice cream and ices		40,345	
Special dairy products		7,984	
Fluid milk and other products		408,261	

the cost structure of combination plants (processing both fluid milk and manufacturing products).

Output, transfers-in, and transfers-out were obtained as described under UC 11. The available supply and distribution pattern is summarized in Table S.15. No purchases were made by the agricultural sectors. Distribution to nonagricultural sectors is described on page 6.

UC 14 Canning, Preserving, Freezing

Composition and Output

UC 14 is comparable to Census industries 2031-37 (115) and is classified on an establishment basis. Components of output are presented in Table S.18.

A preliminary output estimate was obtained from (115) following the procedure outlined for UC 11. The Census excludes dried fruit output dehydrated on farms which subsequently is sold to establishments that only pack and grade for market. This omission necessitated a large adjustment in transfers-in, based on data in (64, 115, 125, and 135). The procedure and reasoning was as follows:

Table S.18

Gross Output, Primary Industry Production, and Transfers-In for UC 14, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Canning, preserving, freezing	1,221,341	1,059,825	161,516
Canned seafood	148,958	148,958	
Cured fish	2,471	2,471	
Canning and preserving food	575,138	571,416	3,722
Dehydrated fruit and vegetables	302,141	148,830	153,311
Pickles and sauces	88,078	84,585	3,493
Packaged seafood	2,236	2,236	
Frozen fruit and vegetables	102,319	101,329	990

The dehydrated vegetable and soup mix industry has been observed expanding in recent years, while the dried fruit industry's output has steadily diminished. There is no evidence of a larger proportion of dried fruit being handled in manufacturing establishments than in 1947. It was therefore assumed that the same percentage of total dried fruit output was handled in manufacturing establishments in 1954 as in 1947, and that the large increase in output of "dried and dehydrated fruits, and vegetables and soup mix" as recorded in the Census (115) was entirely due to increased dehydration of vegetables and soup mix. United States dried fruit transfers-in were thus estimated at the same proportion of total dried fruit production as they were in 1947. California's portion of these transfers-in was assumed to be the same as its percent of total United States production. Adjustments were made for specific fruits, such as apples, which are not dried on farms. Total packs and prices of California and United States dried fruits are available in (64) and (135). The BLS values for transfers-in are in (125). The value of fruit dried in manufacturing establishments in 1947 (but not in 1954) is indicated in (115). The estimated value of transfers-in is not the value to the growers, but rather is the value of the fruit had they been dried in manufacturing establishments. In other words, the transfers-in come from both the farmers and the wholesale-packers.

Distribution

Agriculture does not directly purchase products of UC 14. Distribution to nonagricultural sectors is described on page 6. The distribution pattern for UC 14 is summarized in Table S.15.

UC 15 Miscellaneous Agricultural Processing

Composition, Output, and Distribution

The miscellaneous agricultural processing sector is comparable to the BLS EM sectors 25, 26, 27, 28, and 29 (98, pp. 51-52), defined on an establishment basis. Components of output are listed in Table S.19.

Table S.19

Gross Output, Primary Industry Production, and Transfers-In for UC 15, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Miscellaneous agricultural processing	1,727,143	1,714,093	13,050
Bakery products[a]	358,396	358,396	
Sugar	194,105	194,105	
Miscellaneous food preparations	878,440	865,390	13,050[b]
Alcoholic beverages	292,507	292,507	
Tobacco products	3,695	3,695	

[a] Includes bread baking at single retail outlets.

[b] In all categories except miscellaneous food preparations transfers-in as recorded in the Census (115) are small and not specified as to origin. It is assumed that they are primary to the aggregate, UC 15.

Output was estimated from data in (115) following the first five steps of the procedure outlined under UC 11. For this sector and all sectors following, it was impossible to use the balance equation because of the large size of the sector and the many individual output estimates involved.

An upward adjustment was made on miscellaneous food preparations to include the wholesale value of shelled and unshelled nuts (131) not included in the Census figures. The BLS study distributed nuts directly from farms to households. In view of the concentration of nut processing plants in California, nuts were routed through UC 15 in the California Model.

No purchases from UC 15 are made by agricultural sectors. The distribution pattern for UC 15, derived as described on page 6, is summarized in Table S.15.

UC 16 Chemicals and Fertilizers

Composition and Output

The chemicals and fertilizers sector is comparable to BLS EM sectors 48-61 (98, pp. 38-61). Components of this sector and their corresponding outputs are listed in Table S.20.

Outputs, inventory changes and transfers-in were derived from (115) as described for UC 15. Where the Census classifications (115) were not exactly comparable with BLS classifications (125), it was assumed that the differences in output remained proportional to the differences between the 1947 Census (115) and the BLS statistics (128).

The available supply and distribution of products of the chemical and fertilizer industry is summarized in Table S.21. Distribution to nonagricultural sectors is described on page 6.

Table S.20

Gross Output, Primary Industry Production, and Transfers-In for UC 16, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Chemicals and fertilizers	865,274	827,030	38,244
Industrial inorganic chemicals	98,934	95,829	3,105
Industrial organic chemicals	68,815	67,671	1,144
Plastics materials	32,974	23,912	9,062
Synthetic rubber	10,058	10,058	
Explosives and fireworks	13,538	13,538	
Drugs and medicine	22,131	22,131	
Soap and related products	137,358	135,665	1,693
Paints, varnishes, and allied products	157,845	157,845	
Gum and wood chemicals	691	691	
Miscellaneous chemical industries	142,679	140,072	2,607
Fertilizers	20,045	19,804	241
Vegetable oils	115,384	109,044	6,340
Animal oils	44,822	30,770	14,052

TABLE S.21

Available Supply and Distribution of the Chemicals and Fertilizers Sector (UC 16) by Components, 1954.[a] (thousands of dollars)

	Chemicals	Fertilizers	Oil mills	Total UC 16
Domestic supply	685,023	20,045	160,206	865,274
(a) Gross domestic output	685,023	20,045	160,206	865,274
(b) Inventory depletion				
Distribution	685,023	20,045	160,206	865,274
(a) Final demand sectors				
(1) UC 27, Scrap and by-products	6,195	4	45,256	51,455
(2) UC 28, Net exports	-314,493	-41,315	-154,546	-510,354
(3) UC 29, Maintenance construction	78,920	34	1,477	80,431
(4) UC 30, New construction	35,051	44	521	35,616
(5) UC 31, Local gov't.	6,836	35		6,871
(6) UC 33, Inventory addition	871	67	21	959
(7) UC 37, Households	240,080	1,080	2,490	243,650
(b) Intermediate sectors				
(1) UC 1, Meat animals and products	1,355			1,355
(2) UC 2, Poultry and eggs	1,516			1,516
(3) UC 3, Dairy farm products	1,676			1,676
(4) UC 4, Food and feed grains	2,736	10,601		13,337
(5) UC 5, Cotton	2,888	12,331		15,219
(6) UC 6, Vegetables	4,850	8,785		13,635
(7) UC 7, Fruit (excluding citrus) and nuts	8,221	12,333		20,554
(8) UC 8, Citrus	1,900	2,892		4,792
(9) UC 9, Forage	3,613	3,473		7,086
(10) UC 10, Miscellaneous agriculture	3,006	4,851		7,857
(11) UC 11, Grain mill products	3,180		3,643	6,823
(12) UC 12, Meat and poultry products	1,761		6,460	8,221
(13) UC 13, Dairy products	3,169			3,169
(14) UC 14, Canning, etc.	5,489		24,439	29,928
(15) UC 15, Miscellaneous agricultural processing	18,963		99,647	118,610
(16) UC 16, Chemicals and fertilizers	174,668	4,426	12,106	300,200
(17) UC 17, Petroleum	43,483		5,677	49,160
(18) UC 18, Fabricated metals and machinery	54,062		66	54,128
(19) UC 19, Aircraft	30,632			30,632
(20) UC 20, Primary metals	4,545		376	4,921
(21) UC 21, Other manufacturing	134,371		3,444	137,815
(22) UC 22, Mining	12,099			12,099
(23) UC 23, Utilities	1,268	4	1	1,273
(24) UC 24, Selected services	39,573			39,573
(25) UC 25, Trade and transportation	21,452	384	128	21,964
(26) UC 26, Unallocated services	51,087	16		51,103

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

Distribution to the Agricultural Sectors

Five main categories of chemicals are used by agricultural sectors. They are (1) insecticides, weed killer, cleansers, and similar products; (2) antifreeze; (3) drugs and medicines; (4) fertilizers; and (5) salt. Each category was individually distributed to the agricultural sectors.

Insecticides, weed killer, cleansers, etc. (inorganic chemicals).--Acres of crop and pastureland treated, the number of applications, and the material cost per acre per treatment for the year 1952 are estimated for each California crop group in (1). It was assumed that the percentage of land treated and the number of treatments remain constant between 1954 and 1952 for each crop group. Per acre costs of materials were adjusted to a 1954 base by the prices paid index for supplies.1/ Estimated purchasers' cost for materials was adjusted to producers' cost by the use of a margin (123, p. B-17). Where the crop group breakdown did not coincide with the UC sector breakdown, further distribution was accomplished by assuming that use was proportional to acreage.

Purchasers' values of inorganic chemical inputs to United States livestock and poultry are listed in (108). Source (123) provides the margin necessary to convert purchasers' value to producers' value (0.2096). United States estimates were converted to California estimates with ratios of livestock and poultry numbers. The combined allocation to beef and dairy cattle was divided by making an independent estimate for dairy and assigning the residual to beef. Inorganic chemical inputs to the 1954 California dairy sector were estimated at the same percent of miscellaneous dairy supplies (105) as they were for the United States in 1947 (123, p. B-35).

Drugs and medicines.--Total purchasers' value of drugs and medicine used by United States agriculture (51) was distributed to the agricultural sectors using percentages given in (97). California's share was derived using California's percent of United States output by value for each sector. Producers' value was specified as 0.4588 of purchasers' value in (51).

Antifreeze.--Antifreeze is the main organic chemical used by agriculture. The purchasers' value for antifreeze used by United States agricultural sectors (i.e., autos, trucks, tractors, and other machinery) in 1955

1/ Prices paid by farmers (index for supplies):

$$\frac{1954}{1952} = \frac{274}{280} = .978$$

is estimated in (97). Consumption in 1955 was assumed to be a reasonable estimate for 1954. Producers' value was 0.6468 of purchasers' value (51). Antifreeze was first allocated to national commodity groups with percentages given in (123, p. B-37) and then to California crops by ratios of acres of these commodity groups grown in California as compared to the United States. No antifreeze was allocated to citrus or cotton. The allocation to California livestock and poultry was proportional to relative numbers of animals or birds in California and the United States. These estimates have a high bias since California has a warmer climate than the United States average. The value of antifreeze is such a small portion of the total value of chemicals used by agriculture, however, that further refinement of the estimates would have a minor effect on the aggregate.

Fertilizers.--California fertilizer use in 1954 by pounds of nitrogen, phosphorous, and potash is estimated for crop groups in (101). The total value of fertilizer used was initially obtained using purchasers' prices for these fertilizer components from (28). However, the resulting total was significantly less than estimates of total value in (107) and (105). The estimate in (105) widely quoted in USDA publications, was used as a control total and the distribution to each crop group was adjusted up proportionately. The value of fertilizer allocated to citrus was assumed proportional to the total value going to all fruits and nuts, based on relative acreage. All fertilizers (excluding lime) were distributed through the chemical and fertilizer sector, althought minor amounts are actually primary to other sectors.[1/] Margins were obtained from (51).

Salt.--Salt was allocated to UC sectors 1, 3, and 10 using California's percentage of United States livestock numbers and United States control totals from (97).

1/ Potash, soda, borate minerals, and phosphate rock are distributed from the nonmetallic mining sector, and ground or treated minerals (including gypsum) from an "other manufacturing" sector in the 1947 BLS and 1955 USDA studies.

Composition and Output

UC 17 is composed of the following subsectors and components:

Crude petroleum and natural gas.--This subsector is defined on a commodity basis comparable to BLS EM-17. Output is quoted in (122).

Petroleum products.--This subsector is defined on an establishment basis and is comparable to BLS EM sectors 62-64. Output was obtained from (115) as described under UC 15. Components of this subsector include petroleum products, coke and products, and paving and roofing materials.

Table S.22 lists the components of output by value.

Table S.22

Gross Output, Primary Industry Production, and Transfers-In for UC 17, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic Transfers-in
Petroleum industry	2,860,687	2,859,790	897
Crude petroleum	1,123,517	1,123,517	
Petroleum products	1,737,170	1,736,273	897
Petroleum products	1,675,911	1,675,014	897
Coke and products	9,820	9,820	
Paving and roofing material	51,439	51,439	

Distribution

Distribution of UC 17 products is summarized in Table S.23. Petroleum products inputs to the agricultural sectors were estimated by the "general method,"[1/] using separate United States control totals for autos, trucks, tractors, other farm machinery, brooding, and building heat as estimated in (97). California's percentages of United States acres, physical output, or

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1/ See page 5.

TABLE S.23

Available Supply and Distribution of the Petroleum Sector (UC 17) by Components, 1954.[a] (thousands of dollars)

	Crude petroleum	Petroleum processing	Total UC 17
Domestic supply	1,123,517	1,737,738	2,861,255
(a) Gross domestic output	1,123,517	1,737,170	2,860,687
(b) Inventory depletion		568	568
Distribution	1,123,517	1,737,738	2,861,255
(a) Final demand sectors			
(1) UC 27, Scrap and by-products		1,231	1,231
(2) UC 28, Net exports	179,364	422,092	601,456
(3) UC 29, Maintenance construction		50,162	50,162
(4) UC 30, New construction	2,008	61,291	63,299
(5) UC 31, Local government		9,857	9,857
(6) UC 35, Capital formation		25	25
(7) UC 37, Households	7,000	547,630	554,630
(b) Intermediate sectors			
(1) UC 1, Meat animal and products		855	855
(2) UC 2, Poultry and eggs		1,195	1,195
(3) UC 3, Farm dairy products		1,259	1,259
(4) UC 4, Food and feed grains		4,056	4,056
(5) UC 5, Cotton		2,064	2,064
(6) UC 6, Vegetables		4,014	4,014
(7) UC 7, Fruit (excluding citrus) and nuts		9,732	9,732
(8) UC 8, Citrus		1,952	1,952
(9) UC 9, Forage		3,053	3,053
(10) UC 10, Miscellaneous agriculture		8,568	8,568
(11) UC 11, Grain mill products		621	621
(12) UC 12, Meat and poultry processing		984	984
(13) UC 13, Dairy products		1,317	1,317
(14) UC 14, Canning, etc.		1,385	1,385
(15) UC 15, Miscellaneous agricultural processing		4,699	4,699
(16) UC 16, Chemicals and fertilizers	1,896	18,393	20,289
(17) UC 17, Petroleum	889,391	175,454	1,064,846
(18) UC 18, Fabricated metals and machinery		9,619	9,619
(19) UC 19, Aircraft		17,416	17,416
(20) UC 20, Primary metals		18,114	18,114
(21) UC 21, Other manufacturing	345	27,579	27,924
(22) UC 22, Mining		6,604	6,604
(23) UC 23, Utilities	42,706	37,471	80,177
(24) UC 24, Selected services		24,822	24,822
(25) UC 25, Trade and transportation	807	128,589	129,396
(26) UC 26, Unallocated services		135,634	135,634

a/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

value output were applied as seemed most applicable to individual sectors and machinery types. The aggregated estimates were adjusted upward by 1.17 percent to meet the control total for 1954 in (105).

Additional inputs were allocated to UC 10 as described in the section on agricultural services.

UC 18 Fabricated Metals and Machinery

Composition and Output

UC 18 is defined on an establishment basis and is comparable to BLS EM sectors 93-147 and 149-152. Components of this sector, their primary production, transfers-in, and gross output are presented in Table S.24.

Table S.24

Gross Output, Primary Industry Production, and Transfers-In for UC 18, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Fabricated metal and machinery	3,997,514	3,924,269	73,245
Tin cans, etc.	218,051	218,051	
Cutlery, tools, etc.	90,053	90,053	
Plumbing, heating equipment	173,236	173,236	
Structural metal, boiler shop production	346,604	344,652	1,952
Metal stamping, etc.	111,451	111,451	
Lighting fixtures	45,740	45,740	
Miscellaneous fabricated metal	195,989	181,930	14,059
Engines, construction machinery	192,074	192,074	
Industrial machinery	565,253	560,392	4,861
Machine shops	151,803	151,803	
Wiring and electrical apparatus	280,004	253,649	26,355
Electrical appliances	72,778	72,778	
Finished electrical equipment	454,793	428,775	26,018
Motor vehicles	972,302	972,302	
Ships and boats	121,981	121,981	
Railroad equipment	5,402	5,402	

Outputs were estimated from (115) for over 100 individual industries as indicated for UC 15.

Distribution

Distribution of the products of sector UC 18 is summarized in Table S.25. Inputs to agriculture were distributed according to the "general method."[1/] Individual distributions were made for auto parts, truck parts, tractor parts, farm equipment parts, auto depreciation, truck depreciation, farm equipment depreciation, small hand tools, wire binding materials, tin containers, and fuel barrels and related items. A single control total for the total purchasers' value of repair parts, tires, and batteries for motor vehicles and other farm machinery for California agriculture is given in (105). Individual control totals also are available in (105) for small hand tools, binding materials, containers, and capital expenditure for tractors, trucks, automobiles, and other machinery and equipment.

Inputs to the agricultural sectors from UC 18 include the "producers' value of depreciation" as well as inputs of noncapital items. Inputs to nonagricultural sectors include only noncapital items. Depreciation was included as an endogenously determined input of the agricultural sectors in recognition of the objective of clearly indicating the indirect relationships between agriculture and industry. Because the value of agricultural depreciation and the value of agricultural capital expenditure have been similar in recent years (80), depreciation is used as the estimate of auto, truck, and machinery purchases required for current production.

Depreciation was not included as an endogenously determined input of nonagricultural sectors since capital expenditure and capital consumed in current production do not show such close correspondence for these sectors as for the agricultural sectors (121).

Previous models (including the 1947 BLS study) have generally excluded depreciation from the endogenous portion of the model for all sectors.[2/]

1/ See page 5.

2/ See Section III of this report for a description of Model II, where all capital items are classified as exogenous for an alternative California Model. It is shown that the "split" classification system of Model I, while providing additional clarity in the discussion of indirect requirements of agriculture, does not significantly distort the analytical results for nonagricultural sectors.

TABLE S.25

Available Supply and Distribution of the Fabricated Metals and Machinery Sector (UC 18) by Components, 1954.[a] (thousands of dollars)

	Subsectors[b]																Total
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	UC 18
Domestic supply	218,051	91,472	174,131	346,849	111,682	45,740	196,490	192,113	566,402	152,080	281,955	72,807	457,491	975,223	121,981	5,402	4,008,859
Gross domestic output	218,051	90,053	173,236	346,604	111,451	45,740	195,989	192,074	565,253	151,803	280,004	72,778	454,793	972,302	121,981	5,402	3,997,514
Inventory depletion		1,419	895	245	231		501	39	1,149	277	1,951	29	2,698	2,921			11,345
Distribution	218,051	91,472	174,131	346,849	111,682	45,740	196,490	192,113	566,402	152,080	281,955	72,807	457,491	975,223	121,981	5,402	4,008,859
Final demand																	
UC 27	1,845	541	730	1,334	878	182	1,239	726	2,454	462	1,364	167	420	4,961	602		17,905
UC 28	59,177	-56,978	- 85,649	-146,718	-105,644	-15,621	- 93,416	-149,287	-421,327	108,872	- 15,497	-86,565	-106,789	-486,138	49,485	-27,467	-1,579,562
UC 29		6,765	84,948	62,631		14,167	26,790	3,733	8,033	67	7,717	1,917	13,816	1,333			231,917
UC 30	21	29,819	86,980	336,907	21	17,710	47,083	19,990	49,293	234	39,319	6,351	80,365	5,989			720,082
UC 31		909	149	99	2,480		52	11,373	3,753	17	149	50	1,224	19,490	17	612	40,374
UC 33	912					22									60	16	
UC 35			3,646	13,064		1,417	3,065	117,879	378,213		73,845	12,012	56,152	134,686	18,375	2,055	814,409
UC 37	2,330	21,840	53,410	970	22,430	9,400	6,300	11,420	70,410		2,690	115,230	92,490	699,850	7,380	14,800	1,130,950
Intermediate sectors																	
UC 1		6					1	1,106						666			1,779
UC 2		7					260	1,483						1,051			2,801
UC 3	1,414	22					1	2,581						2,014			6,032
UC 4		87					39	11,951						4,166			16,243
UC 5		20					16	4,368						2,460			6,864
UC 6		63					39	9,600						4,647			14,349
UC 7		103					102	15,392						7,369			22,966
UC 8		69					19	4,151						2,074			6,313
UC 9		84					1,895	9,553						3,640			15,172
UC 10	167	669					2,097	13,659	306					3,777	1,499		22,174
UC 11	1,702	4					8	281	1,396	378			378	91			4,238
UC 12	5,557	276		277	274	14	449	52	2,735	185	54		369	227			10,469
UC 13	9,713	7			122		94	133	532					59			10,660
UC 14	100,480	56			9,219		353	286	1,590								111,984
UC 15	15,906	49			8,636		1,801	1,268	1,324					231			29,215
UC 16	4,591	17			374	48	5,327	211	4,562	388			317	155			15,990
UC 17	6,097	1,262		3,937		27	11,321	6,511	10,477	1,352	1,135		1,364	633			44,116
UC 18	5,883	36,396	26,987	60,334	88,936	14,511	85,523	51,583	188,382	23,588	92,499	10,183	156,145	259,076	4,956	2,863	1,107,795
UC 19		23,412		4,536	61,720	2,020	48,854	938	156,036	8,399	46,201		115,697	67,029	14,864	10,742	560,448
UC 20		598	549	339	539	110	322	1,759	4,939	197	1,041		812	703			11,908
UC 21	143	15,513	593	4,504	16,752	266	30,186	7,816	42,871	4,193	18,377	1,858	7,412	4,540	87	331	155,442
UC 22		595				168	1,467	5,334	3,779					232			11,575
UC 23		517	2	270	1		138	762	423	220	1,287		12,214	1,110	5		16,949
UC 24		4,655	1,033	2,379	3,033	1,166	5,221	20,737	45,770	186	5,537	10,759	15,216	182,296	11	1,335	299,334
UC 25	2,113	3,368	474	1,921	1,485	51	9,336	3,944	6,173	3,342	2,459	845	5,250	46,757	24,640	115	113,642
UC 26		721	279	65	426	82	508	820	4,278		1,364		4,639	49			14,326

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ a = tin cans, etc.; b = cutlery, tools; c = plumbing, heating equipment; d = structural metal, boiler shop production; e = metal stamping, etc.; f = lighting fixtures; g = misc. fabricated metal; h = engines, construction mach.; i = industrial machinery; j = machine shops; k = wiring and elec. apparatus; l = electrical appliances; m = finished electrical equipment; n = motor vehicles; o = ships and boats; p = railroad equipment.

Carter and Heady (29), however, provide a precedent for the procedure used in the UC model.

The UC model presents one new innovation in this area. Only the "producers' value of depreciation" on farm autos, trucks, and other machinery is distributed from UC 18. Total depreciation (as viewed by the farmer) is a purchasers' value concept. Part of total depreciation originates within the margin sectors of the economy and thus is distributed from UC 25 (trade and transportation) in this model.

UC 19 Aircraft and Parts

Composition, Output, and Distribution

UC 19 is defined on an establishment basis and is comparable to BLS EM sector 148. Output is listed in Table S.26, while distribution is summarized in Table S.27.

Table S.26

Gross Output, Primary Industry Production, and Transfers-In for UC 19, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Aircraft and parts	4,549,607	4,549,607	

Output was estimated from value of shipment, inventory, and employment data in (115) as described for UC 15, and then adjusted upward in proportion to the 1947 BLS study adjustment for research and developmental work not included in the Census.

No purchases were made by agricultural sectors. Purchases by nonagricultural sectors were estimated as described on page 6.

TABLE S.27

Available Supply and Distribution of the Aircraft and Parts Sector, (UC 19), 1954.[a] (thousands of dollars)

	Aircraft and parts
Domestic supply	4,551,849
(a) Gross domestic output	4,549,607
(b) Inventory depletion	2,242
Distribution	4,551,849
(a) Final demand sectors	
(1) UC 27, Scrap and by-products	10,772
(2) UC 28, Net exports	4,103,078
(3) UC 31, Local government	17
(4) UC 35, Capital formation	11,217
(5) UC 37, Households	1,430
(b) Intermediate sectors	
(1) UC 18, Fabricated metals & mach.	2,669
(2) UC 19, Aircraft	416,166
(3) UC 24, Selected services	788
(4) UC 25, Trade & transportation	5,712

[a] Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

UC 20 Primary Metals

Composition, Output, and Distribution

UC 20 is defined in an establishment basis and is comparable to BLS EM sectors 78-92. Components of this sector, their outputs, and transfers-in are presented in Table S.28.

Table S.28

Gross Output, Primary Industry Production, and Transfers-In for UC 20, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Primary metals	895,828	817,108	78,720
Steel	452,775	375,395	77,380
Foundries and forgings	99,079	97,739	1,340
Nonferrous metals	270,781	270,781	
Nonferrous foundries	73,193	73,193	

Output was estimated from (115) as described for UC 15. Agriculture makes no direct purchases from this sector. Distribution to nonagricultural sectors was made as described on page 6. The distribution pattern, by components, is summarized in Table S.29.

UC 21 Other Manufacturing

Composition

UC 21 is defined on an establishment basis and is comparable to BIS EM sectors 30-47, 65-77, 153-162, and 164. Components of this sector, their outputs, and transfers-in are presented in Table S.30.

TABLE S.29

Available Supply and Distribution of the Primary Metals Sector, (UC 20) by Components, 1954[a/]
(thousands of dollars)

	Subsectors[b/]				Total UC 20
	a	b	c	d	
Domestic supply	452,775	99,257	270,781	73,326	895,828
(a) Gross domestic output	452,775	99,079	270,781	73,193	895,828
(b) Inventory depletion		178		133	
Distribution	452,775	99,257	270,781	73,326	895,828
(a) Final demand sectors					
(1) UC 27, Scrap and by-products	7,156	451	8,591	431	16,629
(2) UC 28, Net exports	-421,990	-278,357	-161,097	-39,775	-901,219
(3) UC 29, Maint. construction	37,714	7,679	16,105		61,498
(4) UC 30, New construction	151,678	36,013	63,840		251,531
(5) UC 31, Local government	83				83
(6) UC 33, Inventory addition	76		873		638
(7) UC 37, Households				2,320	2,320
(b) Intermediate sectors					
(1) UC 16, Chemicals & fertilizers	2,013	2,190	9,488		13,691
(2) UC 17, Petroleum	1,352	314			1,666
(3) UC 18, Fab. metals & mach.	372,100	106,819	111,817	35,908	626,644
(4) UC 19, Aircraft	52,516	188,008	80,164	56,224	376,912
(5) UC 20, Primary metals	208,934	13,938	115,863	1,216	339,951
(6) UC 21, Other manufacturing	24,115	8,242	21,955	10,067	64,379
(7) UC 22, Mining	3,791	2,732	420	158	7,101
(8) UC 23, Utilities	2,235	9	17		2,261
(9) UC 24, Selected services		65		266	331
(10) UC 25, Trade & transportation	9,412	11,154	1,088	5,199	26,853
(11) UC 26, Unallocated services	1,590		1,657	1,312	4,559

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ a = Steel; b = Foundries and forgings; c = Nonferrous metals; d = Nonferrous foundries.

Table S.30

Gross Output, Primary Industry Production, and Transfers-In for UC 21, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Other manufacturing	4,610,249	4,600,196	10,053
Textile products	65,121	65,121	
Apparel, house furnishings, etc.	590,448	590,448	
Logging and fabricated wood products	909,862	909,862	
Furniture, etc.	297,478	297,178	300
Paper products	466,241	466,241	
Printing and publishing	659,589	659,589	
Rubber products	282,880	282,880	
Leather products	68,402	68,402	
Clay, etc., products	472,614	472,614	
Miscellaneous manufactured products	797,614	787,861	9,753

Output and Distribution

Output was estimated from (115) as described for UC 15. Distributions of UC 21 subsectors are shown in Table S.31. The districation procedure for nonagricultural subsectors is described on page 6. Inputs to agriculture were estimated by the "general method" (see page 5). Individual distributions were made to agriculture for twine, cordage, canvas products, textile bags, wood containers and cooperage, paper products, paper and paper board, printing and publishing, auto tires and tubes, truck tires and tubes, tractor tires and tubes, other farm machinery tires and tubes, harness and saddlery, glass containers, pottery and related products, and miscellaneous hardware supplies. Miscellaneous hardware supplies include fire extinguishers, ladders, electric light bulbs, other wire except fencing, some cordage, rope, steel cables, pulleys, field bags, sacks, field boxes, flats, crates, and other field containers. Because of the large amount of detail, lack of information, and

TABLE S.31

Available Supply and Distribution of the Other Manufacturing Sector (UC 21) by Components, 1954.[a] (thousands of dollars)

	Subsectors[b]										Total
	a	b	c	d	e	f	g	h	i	j	UC 21
Domestic supply	65,376	592,129	910,150	297,806	466,241	659,589	283,766	68,402	472,614	798,617	4,613,268
(a) Gross domestic output	65,121	590,448	909,862	297,478	466,241	659,589	282,880	68,402	472,614	797,614	4,610,249
(b) Inventory depletion	255	1,681	288	328			886			1,003	3,019
Distribution	65,375	592,129	910,150	297,806	466,241	659,589	283,766	68,402	472,614	798,617	4,613,268
(a) Final demand sectors											
(1) UC 27, Scrap and by-products	108	564	1,841		1,808	916	129	125	299	2,928	8,718
(2) UC 28, Net exports	-454,274	-647,731	- 36,976	97,883	-345,015	-245,861	- 23,111	-212,231	- 92,967	-141,037	-2,296,486
(3) UC 29, Maint. constr.	291	1,758	98,404	9,483	14,716		2,145	88	38,943	2,467	168,295
(4) UC 30, New construction	2,008	6,025	430,390	29,985	21,388		9,869		279,086	8,592	787,343
(5) UC 31, Local government	272	5,815	175	2,275	5,510	14,596	1,256	1,320	993	6,347	38,559
(6) UC 33, Inventory addition					962			44	416		
(7) UC 35, Capital formation	1,559	89	2,551	53,159			626	1,452	1,751	33,774	94,961
(8) UC 37, Households	182,400	1,073,560	11,690	218,560	48,350	207,660	107,760	219,360	38,770	380,360	2,488,470
(b) Intermediate sectors											
(1) UC 1, Meat animals	82	60				54	404			134	734
(2) UC 2, Poultry and eggs	83				11,237	36	308			134	11,798
(3) UC 3, Farm dairy products	100				67	89	560		526	166	1,508
(4) UC 4, Food and feed grains	303					50	503			49	905
(5) UC 5, Cotton	82					74	578			134	868
(6) UC 6, Vegetables	129	6,926	16,003			93	697			216	24,064
(7) UC 7, Fruit (excl. citrus) and nuts	119	195	5,929			282	1,177			217	7,919
(8) UC 8, Citrus	61		5,880			145	257			116	6,459
(9) UC 9, Forage	294					63	390			36	783
(10) UC 10, Misc. agriculture	5,298		92		417	102	546	156	952	558	8,121
(11) UC 11, Grain mill products		13,904			5,249	1,606	510	323	14	38	21,644
(12) UC 12, Meat & poultry proc.		645	3,189		544	405	901		873	148	6,705
(13) UC 13, Dairy products	131		1,049		12,953	198	621		410	329	15,691
(14) UC 14, Canning, etc.			6,237		37,799	11,361	1,181	256	26,429	224	83,487
(15) UC 15, Misc. agri. proc.	117	2,053	3,962		44,453	3,242	2,878	76	21,790	717	79,378
(16) UC 16, Chem. and fertilizers	487	2,181	1,862		19,439	2,614	2,569	368	7,099	3,122	39,741
(17) UC 17, Petroleum	266		1,452		14,148	62	880	17	7,616	2,706	27,147
(18) UC 18, Fab. metals & mach.	13,993	13,872	22,288	28,327	26,626	6,310	61,934	3,673	36,999	35,538	249,470
(19) UC 19, Aircraft	12,525	1,852	12,830	6,611	37,794	25,382	21,619	13,676	16,988	102,311	251,588
(20) UC 20, Primary metals			2,479		5	1,209	438		9,156	283	13,570
(21) UC 21, Other manufacturing	283,539	96,044	279,288	28,453	361,969	105,348	42,163	31,168	52,570	108,556	1,389,098
(22) UC 22, Mining			4,793		2,510		1,109		938	5	9,355
(23) UC 23, Utilities	413	344	217	88	943	6,201	399	415	2,326	787	12,133
(24) UC 24, Selected services	5,231	6,247	1,364	2,417	15,700	13,898	12,725	6,309	11,425	68,261	143,577
(25) UC 25, Trade & trans.	8,119	1,421	8,388	1,076	100,249	35,154	25,548	577	7,786	57,784	246,102
(26) UC 26, Unallocated services	1,640	5,705	24,773	15,345	26,330	468,300	4,197	1,230	1,426	122,617	671,563

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

b/ a = textile products; b = apparel, house furnishings, etc; c = logging and fabricated wood products; d = furniture, etc.; e = paper products; f = printing and publishing; g = rubber products; h = leather products; i = clay, glass products; j = misc. manufactured products.

the relatively minor value involved, these latter items were distributed as an aggregate. Control totals for total purchasers' value of inputs to California agriculture were available in (105) for repair parts, tires, and batteries for motor vehicles and farm machinery, as well as for miscellaneous hardware, containers, binding materials, greenhouse and nursery supplies, and harness and saddlery.

UC 22 Mining

Composition, Output, and Distribution

UC 22 is defined on a commodity basis and is comparable to BLS EM sectors 11-16 and 18-20. Subsectors are: (1) copper, lead, and zinc; (2) other mining (metals); and (3) nonmetallic minerals. A further breakdown is shown with corresponding estimates of gross domestic output in Table S.32. Output estimates were obtained from (122).

Distribution of sector UC 22 by subsectors is presented in Table S.33. Inputs to agriculture are lime and liming materials. A control total for this expenditure was derived by separating total expenditure for fertilizer and lime as given in (105) using percentages derived for the agricultural Census (107). Distribution to individual sectors was made with expenditure for lime by type of farm data in (107).

Distribution to nonagricultural sectors was accomplished as described on page 6.

UC 23 Utilities

Composition and Output

UC 23 is defined on an establishment basis and is comparable to BLS EM sectors 167, 168, and 179. Components of this sector and their corresponding outputs are listed in Table S.34.

TABLE S.32

Gross Domestic Output for UC 22, 1954. (thousands of dollars)

	Gross output
Mineral production	306,109
Copper, lead, and zinc	1,251
Copper ore mining	214
Lead and zinc mining	1,037
Other mining (metals)	100,206
Boron	26,714
Chromite	2,285
Gold	8,326
Magnesium	2,761
Mercury	2,978
Silver	280
Tungsten	13,209
Other	43,653
Stone, sand, clay, and abrasives	191,038
Clay and stone	23,871
Cement	98,251
Marl	22
Perlite	103
Pumice and pumicite	652
Sand and gravel	68,139
Other nonmetallic minerals	13,614
Gypsum	2,804
Lime	3,388
Peat	85
Salt	6,126
Talc	1,211

TABLE S.33

Available Supply and Distribution of the Mining Sector (UC 22), by Components, 1954.a/ (thousands of dollars)

	Subsectors			
	Copper, lead, zinc	Other mining (metals)	Non-metallic minerals	Total UC 22
Domestic supply	1,251	73,492	231,366	306,109
(a) Gross domestic output	1,251	73,492	231,366	306,109
(b) Inventory depletion				
Distribution	1,251	73,492	231,366	306,109
(a) Final demand sectors				
(1) UC 28, Net exports	-16,090	65,227	106,472	155,609
(2) UC 29, Maint. const.			16,318	16,318
(3) UC 30, New const.			55,924	55,924
(4) UC 31, Local govt.			50	50
(5) UC 37, Households			7,620	7,620
(b) Intermediate sectors				
(1) UC 4, Grains			21	21
(2) UC 5, Cotton			61	61
(3) UC 6, Vegetables			76	76
(4) UC 7, Fruit			164	164
(5) UC 8, Citrus			38	38
(6) UC 9, Forage			57	57
(7) UC 10, Misc. agr.			27	27
(8) UC 11, Grain mill			56	56
(9) UC 15, Misc. agr. proc.			222	222
(10) UC 16, Chem. & fert.	1,670	1,456	8,370	11,496
(11) UC 17, Petroleum			1,954	1,954
(12) UC 18, Fab. metals & mach.		160	906	1,066
(13) UC 20, Primary metals	15,450	5,501	1,561	22,512
(14) UC 21, Other mfg.		1,134	26,975	28,109
(15) UC 22, Mining	221	14	4,071	4,306
(16) UC 25, Trade & trans.			423	423

a/ In total net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

Table S.34

Gross Output, Primary Industry Production, and Transfers-In for UC 23, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Utilities	1,589,221	1,586,407	2,814
Electric light and power	597,418	597,418	
Natural, manufactured, mixed and liquified petroleum gas	385,096	382,282	2,814
Telephone and telegraph	606,707	606,707	

Output for the electric light and power industry is the sum of the total revenues of both privately and publicly owned electric utilities as given in (36) and (37), respectively.

Natural, manufactured, and mixed gas gross receipts, quoted in (114) for 1954 were adjusted upward in proportion to Moore's estimate for 1947 (56) as compared to gross receipts quoted in (114) for 1947. The assumption involved was that production not covered by the Census increased in the same proportion from 1947 to 1954 as production covered by the Census.

Gross revenues of telephone companies are available in (26) and (36). Revenues for the telegraph industry could not be obtained in a state breakdown. California telegraph revenues were assumed to be in the same proportion to United States telegraph revenues as state telephone revenues were to United States telephone revenues.

Distribution

Distribution of UC 23 is summarized in Table S.35. Telephone and electricity inputs to agriculture were distributed by the "general method."1/ The resulting California totals corresponded with data in (75, 76, and 107) giving the number of farms having telephones, the number of farms having electricity, and the average phone and electricity bills for July 1954.

1/ See page 6.

TABLE S.35

Available Output and Distribution of the Service and Trade Sectors, 1954.[a] (thousands of dollars)

	UC 23	UC 24	UC 25	UC 26
Distribution of output	1,589,221	4,434,112	8,152,630	10,113,025
(a) Final demand sectors				
(1) UC 28, Net exports	98,179	552,025	264,277	120,000
(2) UC 29, Maintenance construction	2,352	29,394	250,958	19,112
(3) UC 30, New construction	13,116	110,595	629,195	190,112
(4) UC 31, Local government	40,750	15,239	16,037	892,825
(5) UC 32, Federal government	47,475	10,851	303,264	394,704
(6) UC 35, Capital formation			233,573	119,507
(7) UC 37, Households	228,590	3,088,970	4,552,520	6,280,650
(b) Intermediate sectors				
(1) UC 1, Meat animals	1,523	820	15,994	2,553
(2) UC 2, Poultry and eggs	1,742	1,661	30,373	5,268
(3) UC 3, Dairy	1,485	1,316	14,809	7,268
(4) UC 4, Grains	583	3,937	15,511	1,685
(5) UC 5, Cotton	838	1,877	12,601	2,259
(6) UC 6, Vegetables	1,353	3,870	22,522	2,770
(7) UC 7, Fruit	3,153	8,951	18,157	5,915
(8) UC 8, Citrus	744	1,993	6,942	2,436
(9) UC 9, Forage	312	3,552	11,479	2,302
(10) UC 10, Miscellaneous agriculture	3,244	5,931	15,460	3,986
(11) UC 11, Grain mill products	2,266	1,136	27,937	7,590
(12) UC 12, Meat processing	3,636	2,267	26,700	5,356
(13) UC 13, Dairy products	4,754	3,721	19,839	6,091
(14) UC 14, Canning, etc.	7,556	9,050	33,520	40,103
(15) UC 15, Miscellaneous agricultural processing	17,387	15,666	74,884	57,410
(16) UC 16, Chemicals and fertilizers	13,222	2,751	34,346	34,041
(17) UC 17, Petroleum	23,149	9,617	115,506	39,217
(18) UC 18, Fabricated metals and machinery	34,106	12,421	140,669	55,244
(19) UC 19, Aircraft	53,908	16,437	97,549	70,919
(20) UC 20, Primary metals	15,827	2,250	41,179	8,153
(21) UC 21, Other manufacturing	65,507	23,562	203,546	85,215
(22) UC 22, Mining	12,160	7,900	8,071	6,330
(23) UC 23, Utilities	208,045	8,663	33,277	28,641
(24) UC 24, Selected services	114,735	183,135	256,598	305,299
(25) UC 25, Trade and transportation	183,900	201,317	288,407	735,718
(26) UC 26, Unallocated services	579,982	93,237	336,928	674,346

/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

Telegraph inputs were allocated to agricultural sectors in the same proportions as telephone inputs. The control total for agricultural telegraph inputs was derived from (97). No natural gas inputs were assigned to agriculture.

UC 24 Selected Services

Composition, Output, and Distribution

UC 24 is comparable to BLS EM sectors 180, 182, 185, 194, and 187-190. Subsectors of this sector are as follows:

1. Eating and drinking establishments, hotels, motels, and tourist camps--defined on an establishment basis.

2. Laundries and dry cleaning--defined on an activity basis.

3. Other personal services including photographic services, shoe repair and hat cleaning, funeral services and cemeteries, pressing, alteration and garment repair, and other miscellaneous personal services. All components are defined on an activity basis.

4. Business services including credit and collection agencies, building maintenance services, business services not otherwise classified, and wholesale agents and brokers--defined on an activity basis.

5. Automobile and garage repair defined on an activity basis.

6. Other repair services including electrical repair shops; watch, clock, and jewelry repair; armature rewinding shops; and miscellaneous repair services. All are defined on an activity basis.

7. Motion picture theaters, motion picture distribution, and all other amusements--defined on an establishment basis.

Values of output by components are listed in Table S.36. Outputs were obtained from (109) and compared with BLS component outputs and descriptions in (125). If an adjustment was necessary to conform to the BLS descriptions, California data for 1954 were adjusted in proportion to the difference between Census output and BLS output for 1947.

The output distribution for UC 24 is shown in Table S.35. Inputs to agriculture were allocated by the "general method" (see page 5) with individual distributions being made for business services (including farm management

TABLE S.36

Gross Output, Primary Industry Production, and Transfers-In for UC 24, 1954. (thousands of dollars)

	Gross output	Production of the primary industry	Domestic transfers-in
Selected services	4,434,112	4,434,112	0
Hotels, motels, eating and drinking places	1,772,628	1,772,628	
Laundries and dry cleaning	226,595	226,595	
Personal services	421,380	421,380	
Business services	532,034	532,034	
Auto repair services	694,590	694,590	
Other repair services	381,722	381,722	
Motion picture theaters, motion picture distribution, and other amusements	405,163	405,163	

services and notary public fees), auto repair, truck repair, tractor repair, other farm machinery repair, miscellaneous repair services, and horseshoeing. Distribution to nonagricultural sectors is described on page 6.

UC 25 Trade and Transportation

Composition

UC 25 is comparable to BLS EM sectors 169 through 178. Component industries include railroads, trucking, warehousing and storage, overseas transportation, other water transportation, air transportation, pipe line transportation, wholesale trade, retail trade, and local and highway transportation.

Output and Input Defined

Neither the value of goods purchased by the trade and transportation sector for further distribution, nor the value of goods distributed by the trade and transportation sector, are considered flows in the inter-industry framework. Inputs to UC 25 include only goods purchased for productive use in the business (e.g., cash registers, display tables, delivery truck parts, etc.). Output is the value of the service performed in handling or distributing goods and services.

For example, processed meat products (UC 12) consumed by the household sector (UC 37) are considered direct purchases from the meat processing sector (UC 12), rather than as purchases from a retail store (included in UC 25). In the model, the price paid for this processed meat is the price paid to the meat processor--the producers' price. In reality, when purchasing meat (at a purchasers' price) the households are also purchasing services of the trade and transportation sector (UC 25). The difference between the price received by the meat processor and the price paid by consumer (the marketing margin) is an output of the trade and transportation sector.

Output Estimation and Distribution

Current marketing and transportation margins are not available for many of the goods included in the model. Where current margins are available they are not in detail as to the particular trade and transportation component involved. Therefore, 1954 California output for UC 25 was estimated as follows.

Distribution was an integral part of the procedure.

1. It was assumed that the value of trade and transportation inputs to each sector per unit of output was the same as for the United States in 1947. Therefore, inputs to all sectors except UC 25, 26, and 28 were computed by applying technical coefficients from the 1955 USDA and the 1947 BLS studies to estimates of California outputs (see page 6).[1/] Margins for sectors UC 25, 26, and 28 could not be computed until an output estimate for UC 25 was obtained.

2. It was assumed that the total value of output of UC 25 increased from 1947 to 1954 in direct proportion to the increase in value of margins allocated to all other sectors except UC 25, 26, and 28.

3. Moore's (56) estimate of total 1947 California trade and transportation margin inputs to all sectors except UC 25, 26, and 28 were compared to the sum of 1954 California margin inputs for the same sectors.

4. Accordingly, Moore's estimate of total trade and transportation output (the sum of margin inputs to <u>all</u> sectors) was adjusted upward by a factor of 1.7471.[2/] Gross domestic output for UC 25 in 1954 was estimated at $8,152,630,000.

5. Margin inputs from UC 25 to UC 25 were now estimated with 1947 technical coefficients and 1954 estimated output.[3/]

6. Once UC 25 output was estimated, computation of UC 26 output was possible (see discussion page 68) and thus also estimation of UC 25 margin inputs to UC 26.

1/ <u>Most</u> of the margins in the 1955 USDA study were, in fact, taken directly from the more complete 1947 BLS study.

2/ $$\frac{\text{Margins allocated to all 1954 UC sectors except UC 25, 26, and 28}}{\text{Margins allocated to comparable 1947 Moore sectors}} = 1.7471$$

3/ Because the relative outputs of component subsectors of UC 25 were not known, input estimates to UC 25 (both from UC 25 and from other sectors) could not be weighted so as to specifically reflect California conditions. Instead, it was assumed that the relative output of component subsectors was the same as in the BLS study (128).

7. Net exports (UC 28) by UC 25 were derived as the difference between total UC 25 output and total California requirements.

Table S.35 presents the distribution summary for the completed sector.

UC 26 Unallocated Services

Composition

UC 26 is an aggregate of miscellaneous services and industries for which individual output totals could not be obtained. Included in this sector are components comparable to BLS EM sectors 163, 181, 183, 186, 191, 192, 951, and 961 as follows: (1) motion picture production; (2) banking and finance; (3) real estate and rentals; (4) medical, dental, etc.; (5) nonprofit institutions; (6) advertising, including radio and television broadcasting; and (7) small arms and small arms ammunition.

Output and Distribution

Output of $10,213,025,000 was estimated for UC 26 as described below. Distribution of UC 26 output is summarized in Table S.35.

In other sectors output and domestic consumption were specified initially. The difference between the two estimates was assumed to be net exports. For UC 26, net exports and domestic consumption were estimated first and added together to obtain total output.

Consumption of UC 26 output was derived for 25 endogenous sectors (excluding UC 26) with USDA and BLS technical coefficients combined with California output estimates. Consumption of UC 26 output by exogenous sectors was estimated as explained in the individual sector discussions. Two estimates need special explanation--net exports by UC 26 and the internal flows to UC 26.

The only component of UC 26 that had net imports or exports was motion picture production. A rough estimate of this component's exports was made after comparing output data on motion picture production from the 1947 Census of Manufactures and the 1954 Census of Business[1/] with the export estimate in Moore's 1947 California Model (56).

1/ A drastic change in definitions of output was made between the 1947 and 1954 Censuses. Therefore, the data were only roughly comparable. The 1954 output estimate was not consistent with the BLS sector definition and could not be used independently with BLS technical coefficients.

The remaining cell in row 26, the internal flow, was estimated simultaneously with gross domestic output since the internal flow must be consistent with both the input and output structure of the sector.[1/] The necessary assumption involved in this procedure, so that a single technical coefficient could be derived from the several 1947 BLS sectors, was that outputs of the component industries were in the same proportions in California in 1954 as in the United States in 1947. Since the majority of United States motion picture production is situated in California, this assumption is somewhat unrealistic. However, two facts provide mitigation.

1. A much smaller proportion of total United States motion picture production originated in California in 1954 than in 1947 (109, 115). As this trend continues (which appears to be occurring) the assumption of equal relative proportions of component outputs becomes increasingly realistic.

2. Exogenous inputs to UC 26 are large compared to endogenous inputs. Thus, this sector's input structure does not play such a dominant role in the solution of the model as it would if a greater proportion of input were endogenously determined.

UC 27 Scrap and By-products

Composition, Output, and Distribution

The total output of the dummy sector--scrap and by-products, was derived by summing the individual scrap and by-product outputs of each producing sector (i.e., the scrap and by-product input column). Outputs from sectors UC 2 to 10 were discussed in the descriptions of these sectors. For sectors UC 1, 12, 14, and 17 through 21, it was assumed that scrap and/or by-products were produced by individual component industries in the same proportion to gross domestic output as in 1947. Individual attention was given by-product outputs of agricultural processing sectors UC 11 and 15, producers of by-product livestock feeds, and UC 16, a producer of vegetable

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1/ Solve for X where X is the gross domestic output of sector 26; $x_{26.26}$ are the direct dollar inputs from sector 26 per unit of output of sector 26; and Z is the net domestic output of sector 26, derived by summing all flows except the internal flow. See equation below:

$$x_{26.26} X = X - Z$$

and animal oil meal. Components of the scrap and by-product sector and their estimated value of output are presented in Table S.37. Distribution of UC 27 is summarized in Table S.38a.

By-products from UC 11.--The total value of rice cleanings and polishings, flour and meal screenings, corn gluten and hominy, brewers' grains, and distillers' grains fed in the United States in 1955 is estimated in (97). It was assumed that each of these by-product feeds was fed in California in proportion to the total production of the producing industry in California as compared to the United States and the total value of that feed fed in the United States. Thus, only that portion of the by-product that was fed to livestock outside of prepared feed mixes was included in the by-product sector. Net imports and exports of unprocessed by-products were assumed to be zero. Each feed was distributed among consuming sectors using proportions from (97) and the "general method" (see page 5).

By-products from UC 15.--Jennings (43) indicated there were no imports or exports of beet pulp from California in 1950. Information is not available for 1954. However, California production and California cattle numbers have changed only slightly relative to those of the United States between 1950 and 1954. Therefore, it is assumed that a comparable situation prevailed in 1954. Output was defined as the value of beet pulp fed to California livestock excluding beet pulp used in prepared feeds. Beet pulp by-product output was estimated as California's percent of United States sugar beet production times the value of beet pulp fed to livestock in the United States (97).

Jennings (43) allocated 15 percent of all United States feed molasses to California livestock sectors. The total amount fed in the United States in 1955 is estimated in (97). California refines only 11 percent of all sugar cane (the source of molasses) processed in the United States, thus, imports of molasses are indicated. Source (130) confirms the California molasses import estimate.

By-products from UC 16.--Production of by-product cake and meal was estimated using the relative proportions of gross domestic output of oil mills in 1947 and 1954, and by-product cake and meal production in 1947 (125, 127). The cottonseed and cake portion of the estimate was verified

TABLE S.37

Components of Output of the Scrap and By-product Sector (UC 27), 1954
(thousands of dollars)

Producing sector	Scrap or by-product	Value
UC 1	Farm hides	147
UC 3	Dairy culls	45,357
UC 5	Cottonseed	35,561
UC 6	Vegetables	1,724
UC 10	Horse & mule culls	40
UC 11	Flour and meal	783
UC 11	Rice screenings	274
UC 12	Packers' hides	33,163
UC 15	Gluten and hominy	46
UC 15	Molasses	1,139
UC 15	Beet pulp	2,090
UC 15	Brewers' grains	266
UC 15	Distillers' grains	127
UC 16	Vegetable cake & meal	28,776
UC 16	Animal oil	7,920
UC 16	Cotton linters	7,697
UC 17	Coke oven gas	965
UC 20	Slag	57
UC 20	Gold and silver	7,454
UC 20	Blast furnace gas	460
UC 14	Waste products, metal	314
UC 15	Waste products, metal	919
UC 16	Waste products, metal	7,062
UC 17	Waste products, metal	266
UC 20	Waste products, metal	6,332
UC 18	Waste products, nonmetal	28,681
UC 20	Waste products, nonmetal	11,044
	Total Scrap and By-products	228,660

TABLE S.38a

Distribution of Inputs from the Final Demand Sectors, 1954.[a] (thousands of dollars)

	UC 27	UC 28	UC 29	UC 30
Distribution of output	228,660	579,515	1,618,134	4,810,184
(a) Final demand sectors				
(1) UC 28, Net exports	- 10,394			
(2) UC 29, Maintenance construction	374		270	
(3) UC 30, New construction	5,687	171		
(4) UC 31, Local government		924	362,272	711,184
(5) UC 32, Federal government			109,830	300,000
(6) UC 33, Inventory addition	372			
(7) UC 35, Capital formation		36,808		3,799,000
(8) UC 37, Households		110,470	21,285	
(b) Intermediate sectors				
(1) UC 1, Meat animals	9,293	113,270	3,766	
(2) UC 2, Poultry and eggs	945		2,222	
(3) UC 3, Dairy	6,304	10,475	4,140	
(4) UC 4, Grains			2,640	
(5) UC 5, Cotton			3,465	
(6) UC 6, Vegetables			4,059	
(7) UC 7, Fruit			2,680	
(8) UC 8, Citrus			1,065	
(9) UC 9, Forage			1,714	
(10) UC 10, Miscellaneous agriculture	301	195	3,256	
(11) UC 11, Grain mill products	39,622		526	
(12) UC 12, Meat processing	45,357	1,632	1,963	
(13) UC 13, Dairy products			2,164	
(14) UC 14, Canning, etc.			4,362	
(15) UC 15, Miscellaneous agricultural processing		109,062	5,117	
(16) UC 16, Chemicals and fertilizers	42,412	10,764	1,435	
(17) UC 17, Petroleum	9	511	4,412	
(18) UC 18, Fabricated metals and machinery	4,049	8,891	10,384	
(19) UC 19, Aircraft		25,737	17,557	
(20) UC 20, Primary metals	67,111	72,097	3,914	
(21) UC 21, Other manufacturing	16,367	17,243	12,423	
(22) UC 22, Mining		452	495	
(23) UC 23, Utilities	851	7,370	90,035	
(24) UC 24, Selected services		41	23,883	
(25) UC 25, Trade and transportation		52,763	203,156	
(26) UC 26, Unallocated services		639	753,644	

a/ Net imports are shown as negative net exports. Total inputs are distributed rather than domestically produced inputs only. (See discussion of sector UC 28.)

against data in (113). Inventory data for cottonseed meal and cake was also given in (113). Because oil mill products are a major source of animal feed and are transported freely, the "general method" (see p. 5) of distribution was used. United States by-product oil cake and meal distributions were adjusted to California distributions using ratios of livestock numbers. Imports were derived as residual.

UC 28 Net Exports and Imports

Definition and Construction

Exports.--Net exports are defined as the difference between a sector's gross domestic output and domestic consumption of that sector's products. Federal government purchases are included in net exports for all endogenous sectors except UC 23, 24, 25, and 26. Estimation of net exports is covered in individual discussions of producing sectors as well as on pages 28-30 of the text.

Imports.--Imports were estimated in two general categories: (1) competitive and (2) noncompetitive, although all imports are considered noncompetitive in the final model.

Competitive imports are imports of the same type of goods as are produced within the state. Where imports are derived as the difference between state production and state consumption, they are "competitive."

For the purposes of this model noncompetitive imports are defined as goods which are imported in a fixed ratio to output. Thus, while importation of wheat is certainly a substitute for domestically produced grain, in the final model it is assumed that output by wheat consuming sectors requires a fixed percent of imported wheat. Wheat imports are therefore noncompetitive.

Estimation of competitive imports by the residual method and their subsequent redistribution to consuming sectors is discussed in Part I (The Input-Output Models and Results) and under "Aggregation Problems" in this section. Table S.39 lists California net exports and competitive net imports before redistribution by sector of origin. Estimation of the other category of imports, considered noncompetitive throughout the construction of the model, is discussed below. These noncompetitive imports were of three types.

TABLE S.39

California Net Imports and Exports by Sector of Origin, 1954
(thousands of dollars)

UC Sector		Net exports	Net imports
UC 1	Meat animals and products		247,834
UC 2	Poultry and eggs	1,637	
UC 3	Dairy products		
UC 4	Food and feed grains		25,384
UC 5	Cotton	227,897	
UC 6	Vegetables	141,307	
UC 7	Fruits and tree nuts (exclud. citrus)	49,766	
UC 8	Citrus	108,603	
UC 9	Forage		2,958
UC 10	Miscellaneous agriculture	44,614	
UC 11	Grain mill products		43,653
UC 12	Meat and poultry processing		190,940
UC 13	Dairy products		95,350
UC 14	Canning, preserving, freezing	826,736	
UC 15	Miscellaneous agri. processing		178,535
UC 16	Chemicals and fertilizers		510,354
UC 17	Petroleum	601,456	
UC 18	Fabricated metals and machinery		1,579,562
UC 19	Aircraft	4,103,078	
UC 20	Primary metals		901,219
UC 21	Other manufacturing		2,296,486
UC 22	Mining	155,609	
UC 23	Utilities		98,179
UC 24	Selected services	552,025	
UC 25	Trade and transportation	264,277	
UC 26	Unallocated services	120,000	
UC 27	Scrap and by-products		10,394

1. Purchases of feeder and stocker livestock and dairy cattle from out of state. Since within-state output and sales of these types of animals were not included in the model, livestock imports could not be estimated by the residual method. Sources are listed in the discussions of UC 1 and 3.

2. Purchases of products produced in the United States but not in California. Examples are products of the iron ore, bauxite, and sulfur mining industries; the synthetic fiber, locomotive, and railroad equipment manufacturing industries; and the copper, zinc, and aluminum segments of the primary metals industries. All inputs of products from these industries (derived as described on p. 6) were allocated directly to noncompetitive imports.

3. Purchases of products not produced in the United States. Sector inputs were derived using California output estimates and technical coefficients developed from flow data on noncompetitive imports in the 1947 BLS model.

The aggregate distribution of these three types of noncompetitive imports is shown in Table S.38a.

Domestic sector distributions presented throughout this section show imports as negative net exports. They have not been redistributed to consuming sectors and are therefore competitive. For this reason most sector distributions in this section do not correspond to sector distributions of Table I-I in Appendix A of the main report. Imports in Table I-I are shown as entirely noncompetitive. Corresponding sectors having net exports are, of course, identical.

UC 29 Maintenance Construction

Composition and Output

Maintenance construction is defined on an activity basis and is comparable to the BLS sector EM-212 (126). Output includes all work done on force account in addition to that by construction contractors.[1/]

1/ Force account construction is construction performed for an industry by its own employees. For example, total employment by the dairy products industry was estimated as 20,631 men in 1954, but 138 of these employees were employed for construction purposes (136).

Construction, including new construction as well as maintenance, is defined as the design, erection, maintenance, and repair of immobile structures and utilities together with those service facilities which become an integral part of the structure.

Total output was estimated as follows. The value of total construction and the value for maintenance and repair activity for the United States is estimated for 1954 in (118). Maintenance and repair activity was 37.03 percent as large as total new construction. No state breakdown for the value of maintenance construction activity is available. However, data in (117) indicated that in the West building permit activity for additions, alterations, and repairs was 8.8 percent of total building permit activity as compared to 8.9 percent for the United States as a whole. It was assumed that construction not covered by permit was proportional to that covered by permit. California maintenance construction was therefore estimated as 36.61 percent[1/] of California new construction. Components of gross domestic output by sector of origin are presented in Table S.40.

Table S.40

Gross Output (UC 29), 1954. (thousands of dollars)

Gross domestic output	1,658,134
Private maintenance construction	1,186,032
State and local government maintenance construction	362,272
Federal government maintenance construction	109,830

Distribution

Distribution of sector UC 29 is presented in Table S.38a. Inputs of maintenance construction to the government and household sectors were estimated as discussed in the descriptions of sectors UC 31, 32, and 37. Other inputs from UC 29 first were distributed with technical coefficients derived

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1/ $\frac{37.03}{8.9} = \frac{X}{8.8}$; $X = 36.61$

from Table I of the 1947 BLS model (128) and then adjusted upward by a constant percent so that the sum of the inputs equaled the total output estimate.

Maintenance Construction Input Structure

The input structure of the 1947 BLS maintenance construction sector was used as the basic distribution. This distribution was adjusted to reflect 1954 price relationship with indices of wholesale building material prices listed in (117). The resulting distribution was proportioned downward to equal California total output.1/

UC 30 New Construction

Composition and Output

UC 30 is defined on an activity basis. Construction is defined in the discussion of UC 29. The inclusion of oil well drilling is the basis difference between this sector and the new construction series of the United States Department of Commerce. Components of output and their values are summarized in Table S.41.

Department of Commerce estimates of private new construction by states were discontinued in 1951. Data showed, however, that the estimated value of California private new construction remained a relatively constant percent of United States private new construction for the years 1947 to 1951 (119). Therefore, it was assumed that the average percent over this 5-year period (12.71 percent) applied for California in 1954. Estimates for United States new construction for 1954 are given in (118).

Table S.41

Gross Output (UC 30), 1954. (thousands of dollars)

Gross domestic output	4,810,184
Private construction	3,518,000
Petroleum and gas well drilling	281,000
State and local government construction	711,184
Federal government construction	300,000

1/ Total outlay (inputs) is equal to total output under input-output model assumptions.

State and local government new construction expenditure was estimated from data in (21, 22, 110, and 116) as explained in the discussion of UC 31.

Federal new construction expenditure in California was estimated by Brubaker (2).

The number of petroleum and gas wells drilled in California and the United States in 1954 is indicated in (114). Cost of construction figures for states, however, were discontinued in 1951 (119). Therefore, a cost per well projection for 1954 was made using the 1947 to 1951 California cost series. Total value was estimated as total wells drilled times cost per well.

Distribution

All new construction except public construction was allocated to gross private capital formation (UC 35). Public construction was allocated to the actual governmental sector making the expenditure. Table S.38a presents these distributions.

New Construction Input Structure

Inputs to the 1947 BLS new construction sector were used as the basic distribution. They were adjusted to the 1954 California new construction outlay total as described in the discussion of the input structure of UC 29.

UC 31 State and Local Government

Composition

UC 31 includes state, county, city, special district, and school district governments. Activities which are also performed by private sectors, such as electric utilities and transportation systems, are included in the appropriate private sector. The output of public education (as measured the value of its inputs) is distributed from UC 26. School district governments are the purchasers of this output rather than the producers.

Output and Distribution

Output is defined as the services rendered by the component governments as measured by their total receipts on current account. Total receipts on current account include taxes, licenses, fees, fines, federal

grants-in-aid, contributions for social insurance, and other minor items received by the government during 1954. Note that taxes, etc., are considered as the output of government in input-output formulations--not as inputs to government. Inputs to government are the purchases made by government, just as inputs to nongovernmental sectors are those sector's purchases. Taxes are sector's "purchases" of governmental output, just as all other expenses of nongovernmental sectors are purchases of output. Output flows between components of state and local governments are netted out, with the exception of government contributions for social insurance. Distribution of UC 31 is presented in Table S.38b.

Data on government receipts are given in (21, 22, and 110) for fiscal years 1953-54 and 1954-55. Other than for the state government, however, this data is not in a form useful for input-output analysis. The Census of Governments (116) presented complete output information in the proper form for 1957. A partial distribution of government receipts was made for 1957 and adjusted to calendar 1954 with control totals and fragmentary information from (21, 22, and 110).

Complete distributions of government receipts were possible only to sectors UC 31 (government contributions to social insurance) and UC 32 (federal grants-in-aid to California) with the above sources. The further allocation of taxes, fees, licenses, etc., among the remaining nongovernmental sectors was made with technical coefficients derived from Table I of the 1947 BLS study (128) and Table I of the 1955 USDA study (51). This preliminary distribution was adjusted upward by a constant proportion to correspond with the estimate of total receipts for California.

State and Local Government Input Structure

Total outlays by governments, in contrast to the endogenous sectors of the economy, need not equal total output. Thus, total expenditure on current account, the definition of gross outlay by governments, required individual estimation. The same sources and procedures used for estimating gross revenue applied, however.

Government and construction sector inputs were estimated individually. Other input expenditures were estimated by adjusting the 1947 BLS input distribution of state and local governments to 1954 prices using indices of prices paid for consumer goods (121), and "scaling down" the resultant

TABLE S.38b

Distribution of Inputs from the Final Demand Sectors, 1954[a/]
(thousands of dollars)

	UC 31	UC 32	UC 37
Distribution of output	3,963,451	5,479,258	32,669,746
(a) Final demand sectors			
(1) UC 28, Net exports			
(2) UC 29, Maint. construction	5,415	17,223	724,415
(3) UC 30, New construction	26,880	69,020	1,851,291
(4) UC 31, Local government	134,013		1,566,227
(5) UC 32, Federal government	360,374	16,426	3,649,000
(6) UC 33, Inventory addition			
(7) UC 35, Capital formation	1,699	34,909	124,422
(8) UC 37, Households	1,526,803	3,266,036	322,610
(b) Intermediate sectors			
(1) UC 1, Meat animals	5,667	268	54,726
(2) UC 2, Poultry and eggs	4,662	815	44,826
(3) UC 3, Dairy	10,660	558	140,750
(4) UC 4, Grains	7,759	1,036	112,599
(5) UC 5, Cotton	6,536	1,411	200,243
(6) UC 6, Vegetables	9,794	2,169	363,396
(7) UC 7, Fruit	11,572	1,973	212,646
(8) UC 8, Citrus	4,699	752	95,323
(9) UC 9, Forage	10,119	1,177	114,006
(10) UC 10, Misc. agriculture	8,732	2,238	187,418
(11) UC 11, Grain mill products	1,248	8,180	95,624
(12) UC 12, Meat processing	1,933	9,647	215,695
(13) UC 13, Dairy products	4,086	12,598	126,474
(14) UC 14, Canning, etc.	9,115	46,074	247,900
(15) UC 15, Misc. agri. processing	14,198	74,325	528,955
(16) UC 16, Chem. & fertilizers	5,835	42,243	231,299
(17) UC 17, Petroleum	64,656	49,457	1,265,253
(18) UC 18, Fab. metals & mach.	23,711	190,314	1,466,314
(19) UC 19, Aircraft	15,196	108,594	2,490,548
(20) UC 20, Primary metals	5,396	35,301	233,461
(21) UC 21, Other manufacturing	31,965	236,035	2,106,926
(22) UC 22, Mining	19,809	12,677	187,175
(23) UC 23, Utilities	159,465	110,777	827,219
(24) UC 24, Selected services	135,223	242,972	2,235,837
(25) UC 25, Trade & trans.	341,393	554,942	5,015,171
(26) UC 26, Unallocated services	994,838	229,111	5,631,997

a/ Net imports do not occur. Therefore distribution is of domestically produced inputs only. (See discussion of sector UC 28.)

structure to correspond to estimates of total outlays by the California governments.

UC 32 Federal Government

Output and Distribution

Total receipts on current account collected[1] in California were defined as the gross output of the federal government sector.[2] Total receipts were estimated following the procedure outlined in the Appendix of (154) with data from (114, 120, and 132). Distribution of the output of UC 32 is shown in Table S.38b.

Government contributions for social insurance (the internal flow) were estimated separately. Other federal revenues were assigned to the contributing sectors by estimating the relative proportions that sectors contributed with technical coefficients derived from the 1947 BLS and 1954 USDA studies, and adjusting all sectors' contributions upward to correspond to the 1954 control total for California.

Federal Government Input Structure

Estimates of inputs from households, new construction, and state and local government are made by Brubaker (2). Although Brubaker estimated total federal expenditure in California, no separation of total business expenditure is presented either on the basis of product class or producing industry.

Estimates of federal government expenditure in the United States, classified by producing industry, are presented in (128). The distribution of purchases by the federal government is undoubtedly different in each state, however. Therefore, a simple proportional "scaling down" of this input distribution is not adequate as an estimate of governments'

1/ The incidence of federal taxes on Californians is much larger than collections. Mushkin (59) estimates incidence as 17.4 percent greater than collections for 1953-54.

2/ See the discussion of UC 31 for an explanation of the output definition for governments.

purchases from within a particular state. One alternative is to assume total United States purchases are divided among the states in proportion to production. However, this procedure is questionable for sectors producing highly transportable commodities.

In the California Model, estimates of federal government purchases were made only for sectors producing commodities not usually imported or exported. Federal government purchases of products of other California sectors are considered net exports. Net exports are derived as the difference between a sector's production and estimated domestic consumption. Whether the export is actually shipped out of state or is in reality used by the federal government within California is not specified.

Estimates for sectors UC 23, 24, and 26 (nontransportable commodities) were made by adjusting 1947 United States estimates (128) to 1954 prices with price inflators from (121), and assuming purchases in California were directly proportional to federal government employment in California.

Trade and transportation (UC 25) inputs to federal government were estimated by applying an average trade and transportation margin developed from (128) to Brubaker's (2) estimate of total purchases from business sectors.

UC 35 Gross Private Capital Formation

Composition and Input Structure

Gross private capital formation occurs as a purchasing sector only. Distribution of depreciation inputs to consuming sectors (which corresponds to the output distributing portion of UC 35) is included as part of households (UC 37).

Inputs assigned to the gross private capital formation sector include: (1) producers' durables produced in California in 1954 and not purchased by either government sector, (2) producers' durables imported by private sectors, (3) private new construction, (4) taxes paid on purchases of producers' durables and construction activity, and (5) labor used in force account construction.

Producers' durables purchases in the United States, classified by producing industry, are listed in (121) for both 1947 and 1954. The 1954 estimates could not be used directly since they were in purchasers' rather than producers' value. Consequently, indices of combined price change and

production expansion were devised from this data, and the indices used to adjust 1947 BLS producers' value estimates (128) to 1954. Resulting estimates of purchases of producers' durables were then "scaled down" by a constant factor (.0669) reflecting the proportion of new machinery and equipment purchased in California relative to the United States (115). Finally, estimated purchases of producers' durables from UC 18 were adjusted downward by an amount equal to the total value of capital items distributed directly to the agricultural sectors.[1/]

Inputs from the government and household sectors were assumed to be in proportion to purchases of total producers' durables in the 1954 as compared to total purchases listed in the 1947 BLS table.

The new construction input was estimated as described under sector UC 30.

UC 37 Households

Composition

Expenditures for goods and services by individuals appear as purchases by the household sector. Household outputs include wages, salaries, proprietors' income, depreciation on capital inputs, and interest charges. Distribution of output is presented in Table S.38b.

Distribution

The household input to each of the 26 endogenous sectors was estimated as the difference between gross domestic output[2/] and the sum of all inputs except the household input. The implicit assumption was that other input components were estimated without error. However, as a check, independent estimates were made for total household expenditures to the two groups of sectors--agriculture and nonagriculture.

Household inputs to California agriculture were estimated from data given in (78). Included items were hired labor (defined as cash wages, perquisites, and social security taxes paid by employers), interest on farm mortgage debt,

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1/ Consult section III of this report (Part II) for a more complete discussion of this problem.

2/ Gross domestic output = gross outlay under the assumptions of input-output theory.

nonreal estate mortgage interest, depreciation and other consumption of farm capital less depreciation included in sector UC 18, and proprietors' income. Proprietors' income was defined as cash receipts from farming excluding government payments, plus the value of home consumption, plus the rental value of farm dwellings, plus the net change in farm inventories, less production expenses, less rent paid to off-farm landlords, less payments to the federal government (not including federal income taxes which are a household expense rather than a production expense).

Table S.42 summarizes total household inputs to agriculture. Total estimated household inputs were $1,487,131,000, while household inputs computed as a residual were $1,476,063,000--a difference of 0.7 percent.

Table S.42

Components of Household Accounts
Associated With Agriculture, 1954. (thousands of dollars)

Total	1,487,131
Hired labor wages	343,200
Service building depreciation	74,431
Interest (mortgage and short term)	54,200
Proprietors' income	924,300

The attempt to obtain an independent estimate for California household inputs to nonagricultural sectors was not entirely successful. Appropriate data are available only for the United States as a whole (121). A rough estimate of California household inputs was made by adjusting an estimate of United States household inputs downward in proportion to the relative value of personal income in the two areas. The "independent" input estimate was less than the "residual" estimate by $1,051,428 or 3.4 percent. However, the direction of the difference suggests personal incomes are not a completely appropriate measure to which to tie the adjustment. Most nonhousehold inputs per unit of output were developed from 1947 technical coefficients. Since increased technical efficiency is assumed to have occurred since that date, the difference between nonhousehold inputs and

gross output should presumably be smaller than an "independent" 1954 estimate would show. Instead,the "residual" estimate is larger. Nevertheless, correspondence of the two estimates is within an acceptable range.

Household flows to exogenous sectors each were estimated as described in the individual sector discussions.

Purchases by Households

Purchases from sectors UC 1 through 10 were estimated as described in the individual sector discussions. In these cases (for the agricultural sectors) the household input was usually estimated as the residual between production and consumption by sectors other than households. For sectors UC 10 through 37, however, exports were estimated as the residual; thus, household inputs were estimated independently.

The only complete source listing value of products purchased by households, classified by producing industry, is the 1947 Bureau of Labor Statistics study for the United States (128). Six adjustments were necessary to adapt this demand to California for 1954. They are as follows:

1. The 1947 list of household purchases was adjusted to 1954 prices with a set of price inflators for personal consumption items published by the United States Department of Commerce (121).

2. Each item was multiplied by an expansion factor, developed from (121), to change the list from United States 1947 household demand expressed in 1954 prices to United States 1954 household demand. For example, expenditure for food and beverages in the United States (expressed in constant 1954 dollars) increased by 1.0835 between 1947 and 1954, while expenditure for autos and auto parts increased by 1.8108.

3. Total household expenditure less payments to government[1/] is identical with the Department of Commerce's estimate of personal expenditure. While personal expenditure estimates are not published for states, there are published estimates of personal disposable income. Total personal expenditure for California was estimated at the same proportion of United States personal expenditure as California personal disposable income is of United States personal disposable income (121).

1/ Payment to governments was estimated as discussed under UC 31 and 32.

4. The distribution of 1954 United States personal expenditure [developed in (2) above] was "scaled down" proportionately so that total personal expenditure corresponded with the California control total [developed in (3) above].

5. Purchases from sectors UC 10 through 15 (the food processing sectors) were adjusted upward to reflect differences in definition between sectors of the UC and BLS studies, as well as differences in the sectors from which food was purchased in 1947 and 1954. An example of the former difference is that fluid milk was distributed directly from farms to households in the BLS study, while it flows through the intermediate sector, dairy processing, in the UC model. The latter difference is one of social change rather than of definition. Relatively more processed foods (sectors UC 11-15) and relatively less fresh foods (sectors UC 1-10) were purchased by households in 1954 than in 1947. Sources used were (49, 51, 73, 121, and 128).

6. Lastly, the list of purchases was adjusted to reflect preference and price differences between the West[1/] and the United States. For example, data in (49) indicated "Westerners" spend relatively less on radios and televisions and relatively more on automobiles per dollar of personal expenditure than the United States average.

Employment and Hired Labor Wages

The labor component of the household sector is examined in Part I, section V of this report. Estimates were derived as follows: Employment coefficients in physical units were developed by Zusman (136). Employment in each sector includes all wage earners, proprietors, family workers, and related labor that are involved in production but excludes employment hired by that sector for

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1/ The western region is defined as Idaho, Montana, Utah, Colorado, Wyoming, Nevada, Arizona, New Mexico, Washington, Oregon, and California. Preference data is not available for California alone. However, California household purchases comprise 60 percent of western region household purchases. Thus, it is assumed that the western region preference pattern more closely approximates the California pattern than does the average United States preference pattern.

construction purposes. It was assumed that total force-account construction was distributed among the sector in proportion to input of maintenance construction.

Dollar labor coefficients were computed for hired labor only. The total value of hired agricultural labor (78) was distributed using Census data on hired labor by type of farm (107) and total labor use data by commodity (65). Wages for sectors UC 11 through 21 are listed in the Census of Manufactures (115). California Department of Employment data (23), used for sectors UC 22 through 26 and the fisheries component of UC 10, were not directly applicable for the manufacturing sectors because of differences in sector definition.

Hired employment in agriculture (25) was distributed in proportion to wages. Hired employment in other industries was listed in the same sources as for wages. All wage and employment data are summarized in Table S.43.

Aggregation Problems

Problems Involving Net Imports

Construction of Table I-I (Shown in Appendix A, Part I).--In constructing the California Model the total supply of each commodity class (domestic production plus net imports) was initially distributed denoting net imports as negative net exports (see, for example, Table S.25, listing the component distributions of sector UC 18). Each input of each purchasing sector may be made up of two parts: (1) inputs produced domestically and (2) inputs that were imported.

In order to construct Flow Table I-I, where each endogenous sector distributed only domestically produced production, it was assumed that each receiving sector imported each class of goods in proportion to its use of that good relative to total imports. For example, if agriculture used 6 percent, nonagricultural industry used 71 percent, and final demand used 23 percent of the total value of chemicals and fertilizers consumed in the state, these sectors divided the value of imports in the same proportion.

Table I-I includes only the aggregate sector distribution, rather than the many component sector distributions (e.g., only row 18 rather than

TABLE S.43

Components of Household's Labor Input, 1954

Sector no.	Sector	Total employment including force-account construction a/ b/	Employment in force-account construction b/	Hired labor wages	Wages per hired employee
		employees		000 dollars	dollars/hr.
UC 1	Meat animals and products	17,920	240	6,730	1,656
UC 2	Poultry and eggs	29,112	142	11,114	1,656
UC 3	Farm dairy products	59,038	264	21,940	1,656
UC 4	Food and feed grains	19,470	168	14,496	1,656
UC 5	Cotton	42,322	221	48,321	1,656
UC 6	Vegetables	95,874	259	89,393	1,656
UC 7	Fruit (exclud. citrus) and nuts	101,277	171	163,602	1,656
UC 8	Citrus	28,643	68	48,044	1,656
UC 9	Forage	33,773	109	13,851	1,656
UC 10	Miscellaneous agriculture	51,833	208	58,040	3,081
UC 11	Grain mill products	7,869	34	32,782	4,458
UC 12	Meat and poultry processing	19,190	125	84,368	4,406
UC 13	Dairy products	20,631	138	85,268	4,491
UC 14	Canning, preserving, freezing	45,785	278	146,473	3,423
UC 15	Miscellaneous agri. processing	60,152	326	265,836	4,231
UC 16	Chemicals and fertilizers	33,791	91	181,485	5,654
UC 17	Petroleum	52,755	281	340,446	5,559
UC 18	Fabricated metals & machinery	261,934	662	1,105,545	4,610
UC 19	Aircraft	251,188	1,119	1,157,672	5,115
UC 20	Primary metals	41,645	250	179,450	4,611
UC 21	Other manufacturing	334,975	792	1,349,278	4,139
UC 22	Mining	10,085	32	46,059	4,975
UC 23	Utilities	141,351	5,740	490,870	4,321
UC 24	Selected services	396,440	1,523	741,978	3,141
UC 25	Trade and transportation	1,287,740	12,951	3,925,688	3,818
UC 26	Unallocated services	798,350	48,044	1,504,517	4,380

a/ Includes hired labor, proprietors, unpaid family labor, etc.

b/ Source: (136).

rows (a) through (p) as in Table S.25). Thus, the problem arose at what point to distribute net imports--before or after aggregation?

Four situations occurred:

1. All subsectors were net exporters. Each subsector already distributed only domestically produced goods. Since no distributions of imports were necessary, no aggregation problem occurred.

2. All subsectors were net importers. The distribution of the aggregate sector differs depending on whether imports are distributed before or after aggregation. The distribution of imports was weighted by the individual subsector distributions (imports were distributed before aggregation) in the California Models.

3. The aggregate sector was a net exporter, yet some individual subsectors were net importers. Imports of these subsectors may not be distributed without distorting the aggregate. The results would be to increase the apparent value of aggregate net exports and decrease the apparent value of domestic production. Thus, component subsectors were aggregated without subsector input distributions.

4a. The aggregate sector was a net importer, yet many individual subsectors were net exporters. Imports of these subsectors may not be distributed before aggregation without distorting the aggregate. The results would be to change the aggregate sector from a net importer to an apparent net exporter. Thus, component subsectors were aggregated before import distributions were made.

4.b. The aggregate sector was a net importer, yet a few individual subsectors were net exporters. To distribute all imports before aggregation would cause results as outlined in (4a) above. However, subaggregations were made so as to eliminate the few different subsectors. Import distributions from the remaining net importing sectors were then made before aggregation was completed. It is argued that a "better" distribution of imports is achieved when the distributions are weighted by a number of subsectors than if imports were distributed on the basis of the sector aggregate alone.

Thus, the final distribution of domestically produced goods depends on the manner in which component rows of a larger matrix are aggregated.

With the proportional method of distributing net imports as described above, distortions of the import input structure are avoided only if subsectors are aggregated so that each aggregate is composed only of net importers or only of net exporters. However, if this criteria were used as the sole basis for sector classification, meaningless aggregates would result. It would be unrealistic, for example, to aggregate the cotton and aircraft industries simply because both are net exporters. A more important criteria is similarity in output and input structures.

Further Aggregation of the 26 Sector Model.--Table I-I is constructed so that the proportion of imports in each sector's input structure is rigidly fixed. Yet, the above discussion indicates that the net import inputs shown for each sector are a function of the particular aggregation. Thus, Table I-I may not be directly aggregated further. Aggregation is accomplished by further aggregating sectors before import distributions have been made. For example, one might aggregate sectors UC 11 through 15 as they are presented in Table S.15. After aggregation is accomplished, net imports of the newly defined sectors may be distributed to the purchasing industries as explained above.

III CONSTRUCTION AND RESULTS OF MODEL II

Alternatives in Input-Output Systems

In constructing an input-output model, capital expenditures may be considered as either endogenously or exogenously determined. Most previous studies, including the 1947 BLS model, have viewed capital expenditure as exogenous. All purchases of capital items by private producing sectors are entered as inputs of a dummy sector, gross private capital formation, located in the final demand section of the model. Depreciation is then charged as an input to the individual sectors, usually as part of an aggregate "household" sector. This procedure is used since current capital expenditure and current depreciation are not always closely related--especially in times of sudden or unexpected changes in production.

However, because depreciation inputs and capital expenditures appear more closely related to each other for agriculture than for industry (81, 121), UC Model I included depreciation as an estimate of current expenditure related to production for the agricultural sectors. This procedure was used in recognition of the objective of this study of clearly indicating the direct and indirect relationships between agricultural and industrial sectors of the California economy. Carter and Heady (29) in a study with similar objectives on a national scale provide a precedent for this procedure.1/

Thus, Model I considers depreciation as endogenously determined for agriculture yet exogenously determined for industry. Model II was constructed under the more traditional assumption that all depreciation is exogenously determined. The purpose was to investigate the difference in results under the alternative assumptions. It was concluded that the inclusion of depreciation as an endogenously determined input to agriculture was advantageous in emphasizing the structural interrelationships between agriculture and industry, yet did not significantly alter the empirical solution of the interrelationships between nonagricultural industries. Therefore, Model I was chosen for detailed discussion in the text.

1/ See the discussion of sector UC 18 (section II) for the difference in definition of depreciation between the California Model and previous models.

Differences in Models I and II, both in construction and results, are presented below. Because Model II is but a minor modification of Model I, the complete flow, technical coefficient, and interdependence tables are not presented. Modifications of Model I necessary to convert it to Model II are shown, however.

The Flow Table

The Basic Distribution (Imports Considered Competitive)

The basic empirical difference between Models I and II is seen by comparing columns of Table S.44 with corresponding columns in Tables S.25 and S.38b. The distributions to sectors UC 1 through 10 from UC 18 and component subsectors (h) and (n) are smaller in Table S.44 than in Table S.25. Conversely, the distributions to UC 35 are correspondingly larger. That is, the distribution to the agricultural sectors (UC 1-10) from the engines, tractor, and machinery subsector (column h), the motor vehicle subsector (column n), and the aggregate fabricated metals and machinery sector (UC 18), excludes the producers' value of depreciation in Model II but includes this value in Model I. The value of depreciation excluded from direct distribution to agriculture is allocated instead to UC 35 (gross private capital formation). Households (UC 37) distribute more inputs to sectors UC 1 through 10 in Table S.44 than in Table S.38b. In other words, inputs from households in Model II are larger than in Model I because of the inclusion of machinery depreciation in the former. Other entries in the two models remain unchanged.

The Basic Distribution Modified to Show Imports as Noncompetitive

In Table I-I of Model I the basic output distributions have been modified so as to show imports as noncompetitive rather than as competitive.[1/] Table S.45 shows the modifications necessary to Table I-I to convert it to Model II. In this formulation, distributions of net imports (UC 28) in Model II differ from Model I as well as the distributions from fabricated metals and machinery (UC 18) and households (UC 37). Model I distributes imports of capital equipment directly to the agricultural sectors. Model II distributes all capital equipment imports to UC 35 (gross private capital formation).

1/ See discussions of import distributions in Part I of the report and pages 73-75 of Part II.

Table S.44

Distribution of Sectors UC 18 and UC 37, 1954, Model II.[a] (thousands of dollars)

Purchasing sector	Producing sector			
	UC 18 subsectors[b]		Total UC 18	UC 37
	h	n		
UC 1	217	173	397	56,108
UC 2	584	199	1,050	46,577
UC 3	223	413	2,073	144,709
UC 4	1,793	250	2,169	126,673
UC 5	893	418	1,347	205,760
UC 6	1,669	430	2,201	375,544
UC 7	3,170	606	3,981	231,631
UC 8	612	142	842	100,794
UC 9	1,288	346	3,613	125,565
UC 10	1,871	442	7,051	202,541
UC 35	179,403	163,131	904,378	124,422

a/ Only flows differing from Model I are shown. All other flows are as listed in Table S.25 and S.38b.

b/ h = engines, tractors, machinery; n = motor vehicles.

Table S.45

Interindustry Flows of Goods and Services, California Economy, 1954, Model II.[a] (thousands of dollars)

Purchasing sector	Producing sector		
	UC 18	UC 28	UC 37
UC 1	242	118,614	56,108
UC 2	641	21,914	46,577
UC 3	1,493	17,501	144,709
UC 4	1,253	7,778	126,673
UC 5	803	7,183	205,760
UC 6	1,289	10,965	375,544
UC 7	2,317	10,681	231,631
UC 8	494	2,662	100,794
UC 9	2,289	4,388	125,565
UC 10	4,677	11,526	202,541
UC 35	637,399	324,965	

a/ Only flows differing from Model I are shown. All other flows in Model II are as presented in Table I-I.

Technical Coefficients

Technical coefficients (derived by dividing inputs to sector X by the gross domestic output of sector X) differ between Models I and II only where flows differed. Table S.46 presents the necessary modifications to Table II-I to adapt it to Model II.

Table S.46

Technical Coefficients, California Economy, 1954, Model II.[a/] (dollars)

Purchasing sector	Producing sector		
	UC 18	UC 28	UC 37
UC 1	.000718	.352095	.166551
UC 2	.002053	.070188	.149181
UC 3	.004346	.050943	.421225
UC 4	.006337	.039337	.640639
UC 5	.002824	.025263	.723669
UC 6	.002642	.022477	.769811
UC 7	.006822	.031448	.681986
UC 8	.003605	.019428	.735631
UC 9	.012632	.024216	.692952
UC 10	.015866	.039101	.687097

a/ Only coefficients differing from Model I are shown. All other technical coefficients in Model II are as presented in Table II-I.

Interdependence Between Sectors

The alternate method of input distribution had very little effect on the resulting matrix of interdependency coefficients. Only the coefficients describing agriculture's direct and indirect effects on UC 18 (row 18, columns 1-10 of Table III-I) showed large differences. Other coefficients, which reflect only indirect requirements generated by agriculture's requirements for products of UC 18 were similar for the two models.

Table S.47 illustrates these differences in interdependence coefficients. The first two columns show the interdependence coefficients of "producer" sector UC 18 of the two models. The third column shows the difference between corresponding coefficients. Reading the first entries in each of these three columns it is seen that: (1) a one dollar delivery

TABLE S.47

Comparison of Selected Interdependency Coefficients of Model I and Model II

Purchasing sector[a]	Producing sector[a] UC 18			Other producing sectors	Multipliers[d]		
	Model I	Model II	Difference[b]	Difference[c]	Model I	Model II	Difference[e]
UC 1	.028901	.009280	.019621	.005581	1.611261	1.586059	.025202
UC 2	.034557	.016607	.017950	.005107	2.388719	2.365662	.023057
UC 3	.038564	.014445	.024119	.006860	1.702055	1.671076	.030979
UC 4	.070897	.014020	.056877	.016185	1.453851	1.380789	.073062
UC 5	.027347	.008550	.018797	.005347	1.321426	1.297282	.024144
UC 6	.028171	.007900	.020271	.005768	1.276012	1.249973	.026039
UC 7	.058633	.015011	.043622	.012414	1.411206	1.355170	.056036
UC 8	.040948	.009899	.031049	.008836	1.327574	1.287689	.039885
UC 9	.070639	.020963	.049676	.014132	1.369062	1.305254	.063808
UC 10	.065279	.025237	.040042	.011392	1.381886	1.330452	.051434
UC 11	.038135	.019669	.018466	.005256	1.828332	1.804610	.023722
UC 12	.023040	.015535	.007505	.002137	1.809745	1.800103	.009642
UC 13	.043740	.030711	.013029	.003710	2.231487	2.214748	.016739
UC 14	.113723	.100342	.013381	.003806	2.008735	1.991548	.017187
UC 15	.032562	.028029	.004533	.001290	1.811602	1.805779	.005823
UC 16	.027872	.027203	.000669	.000193	1.685786	1.684924	.000862
UC 17	.024456	.024434	.000022	.000007	1.807095	1.807066	.000029
UC 18	1.254808	1.254788	.000020	.000007	1.611860	1.611833	.000027
UC 19	.129074	.129060	.000014	.000002	1.480279	1.480279	.000016
UC 20	.019167	.019151	.000016	.000004	1.522036	1.522016	.000020
UC 21	.040225	.040155	.000070	.000018	1.484667	1.484579	.000088
UC 22	.036666	.036623	.000043	.000011	1.348102	1.348048	.000054
UC 23	.014020	.014000	.000020	.000006	1.341806	1.341780	.000026
UC 24	.067607	.066880	.000727	.000205	1.560104	1.559172	.000932
UC 25	.016981	.016931	.000050	.000014	1.322646	1.322582	.000064
UC 26	.006188	.006139	.000049	.000015	1.329088	1.329024	.000064

a/ Purchasing sectors are the columns and producing sectors are the rows in Table III-I.

b/ The difference between corresponding coefficients of sector UC 18 in Models I and II (e.g., col. 3 = col. 1 - col. 2).

c/ The difference between the sums of coefficients (excluding producing sector UC 18) for purchasing sectors of Models I and II.

d/ "Multipliers" show the direct and indirect effects on the California economy resulting from a one dollar delivery to final demand of a product of that purchasing sector.

e/ The difference between corresponding multipliers of Models I and II (col. 3 + col. 4 = col. 7).

to final demand of products of the meat animal sector (UC 1) requires direct and indirect production by the fabricated metals and machinery sector (UC 18) of 2.8901 cents in Model I; (2) a one dollar delivery to final demand of meat animal products (UC 1) requires direct and indirect production of only 0.9280 cents by UC 18 in Model II; (3) the distribution of "producers' value of depreciation" from UC 18 (Model I) instead of from UC 37 (Model II) caused a one dollar delivery to final demand of meat animals (UC 1) to induce extra direct and indirect requirements of 1.9621 cents' worth of farm vehicles and machinery (UC 18). Other entries in these three columns have analogous descriptions.

The fourth column in Table S.47 summarizes the aggregate difference in the two models excluding the difference in sector UC 18. The first entry in this column shows that the distribution of "producers' value of depreciation" from UC 18 (Model I) instead of from UC 37 (Model II) caused a one dollar delivery to final demand of meat animals (UC 1) to induce extra direct and indirect requirements of 0.5581 cents' worth of products of California sectors, excluding products of sector UC 18.

The last three columns of Table S.47 summarize the aggregate effect of a delivery to final demand on the California economy. The multiplier in each model shows the direct and indirect requirement for all California products induced by a one dollar delivery to final demand of a product of the "purchaser" sector. For example, in Model II a one dollar delivery to final demand of meat animals (UC 1) induces 1.586059 dollars' worth of direct and indirect requirements for California products. The distribution of "producers' value of depreciation" from UC 18 (Model I) rather than from UC 37 (Model II) caused a one dollar delivery to final demand to generate 2.5202 cents (first entry in last column of Table S.47) extra direct and indirect requirements for California products. Thus, the multiplier for Model I equals 1.611261 dollars (1.586059 plus .025202 equals 1.611261).

Examination of other entries in the final column of Table S.47 shows that while multipliers of the agricultural sectors (UC 1-10) are affected by the change in model construction in a range of 2.3 cents to 7.3 cents,

the multipliers of the agricultural processing sectors are affected in a range from only 0.9 cents to 2.4 cents, and changes in the multipliers of the other industrial sectors are insignificant. Thus, inclusion of "producers' depreciation" as an endogenously determined input to agriculture, while emphasizing the interrelationships between agriculture and industry, does not appreciably alter the empirical solution of the interrelationships between nonagricultural industries.

IV CONSTRUCTION OF MODEL III

Model III is a spacial disaggregation of Model I. While it presents the interrelationships of the California economy in greater detail than does Model I, certain compromises in methodology were necessary. Model I is therefore considered the basic formulation rather than simply a higher level of aggregation than Model III. The general method of construction of Model III was to divide each Model I sector's input structure into two components--one for northern California and one for southern California[1/]--in proportion to the relative output of the corresponding regional sectors. The implicit assumption involved is that corresponding technical coefficients (value of input per unit of output) are identical in each region. In a few instances, however, where the assumption of identical technical coefficients was obviously unrealistic, individual coefficients were derived for each area.

Methodology and Sources

Division of Outputs and Inputs

Percentages of California output produced in the North and in the South are presented in Table S.48. These same percentages were used to divide the input structure of corresponding sectors. In many sectors a single input division was made. For instance, because poultry and egg output (UC 2) is distributed 56.57 percent to the North and 43.43 percent to the South, each input flow to this sector was divided in this same proportion.

Where several subsectors are shown, however, the California input structure was disaggregated into smaller industrial subsectors before input division was made. Thus, components of the sector were weighted for differences in relative regional production. For example, inputs into the fabricated metals and machinery sector (UC 18) were distributed between the North and the South in four different subsectors: (1) fabricated metal

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1/ Northern California is defined as that portion of the state north of but not including Santa Barbara, Ventura, Los Angeles, and San Bernardino counties. Southern California includes these counties, plus Orange, Riverside, San Diego, and Imperial. (See Figure 1 in Part I of the report.)

TABLE S.48

Division of California Sector Outputs, by Regions and Primary Data Sources, 1954[a]/

	Sector	Percent of total California output produced in North	Percent of total California output produced in South	Type and source of data used
UC 1	Meat animals and products	67.59	32.41	Value of output for cattle, calves, sheep, lambs, and hogs (107). Physical output for wool and mohair (107).
UC 2	Poultry and eggs	56.57	43.43	Value of output (107).
UC 3	Farm dairy products	59.33	40.67	"
UC 4	Food & feed grains	92.35	7.65	"
UC 5	Cotton	88.38	11.62	"
UC 6	Vegetables	69.44	30.56	"
UC 7	Fruit and nuts	92.39	7.61	"
UC 8	Citrus	19.05	80.95	"
UC 9	Forage	81.54	18.46	Value of output for hay (107).
	hay	77.91	22.09	
	pasture	91.42	8.58	Cropland acres for pasture (107).
UC 10	Misc. agriculture	54.27	45.73	Value of output for crops (107).
	fishing	8.28	91.72	
	other misc. agri.	67.90	32.10	Numbers on farms for horses and mules (107). Value of agricultural services (98) weighted by value of crops (107) for agricultural services. Wages paid data for fishing (23,24).
UC 11	Grain mill products	54.70	45.30	Wages paid data (23,24).
UC 12	Meat and poultry processing	45.12	54.88	"
UC 13	Dairy products	59.05	40.95	See related discussion.
UC 14	Canning, preserving, freezing	74.10	25.90	Wages paid data (23,24).
UC 15	Misc. agri. proc.	54.76	45.24	"
	bakeries	41.48	58.52	
	sugar	79.95	20.05	
	confectionary beverages & misc.	54.76	45.24	
	tobacco	19.91	80.09	

(Continued on next page.)

Table S.48 continued.

	Sector	Percent of total California output produced in North	South	Type and source of data used
UC 16	Chemicals & fert.	46.21	53.79	Value added and employment data (115).
UC 17	Petroleum	47.25	52.75	Output of data for crude petroleum (122).
	crude petroleum	40.72	59.28	
	petroleum proc.	51.48	48.52	Value added and employment data for petroleum processing (115).
UC 18	Fabricated metals & machinery	32.72	67.28	Value added and employment data for components other than transportation equip. (115).
	fab. metal prod.	31.94	68.06	
	machinery (except electrical)	28.16	71.84	Wages paid data for transportation equip. (23,24).
	elec. machinery	32.28	67.72	
	transportation equip. (except aircraft)	37.82	62.18	
UC 19	Aircraft	3.34	96.66	Wages paid data (23, 24).
UC 20	Primary metals	39.01	60.99	Value added and employment data (115).
UC 21	Other manufacturing	40.12	59.88	"
	textile mill prod.	31.29	68.71	
	apparel and fab. textiles	23.17	76.83	
	lumber and wood	88.29	11.71	
	furn. & fixtures	24.63	75.37	
	pulp, paper, paperboard, etc.	46.83	53.17	
	print. & publ.	43.82	56.18	
	rubber products	9.31	90.69	
	leather products	28.41	71.59	
	stone, clay, glass, etc.	36.79	63.21	
	instruments, watches, etc.	8.99	91.01	
	misc. mgf. prod.	15.40	84.60	
UC 22	Mining	51.90	48.10	Value of output data (122).
UC 23	Utilities	48.32	51.68	Value added and employment data (115).
	gas and elec.	50.44	49.56	
	tel. & tel.	44.88	55.12	

(Continued on next page.)

Table S.48 continued.

	Sector	Percent of total California output produced in North	South	Type and source of data used
UC 24	Selected services	38.43	61.57	Value of output data (109).
	personal serv. &			
	auto repairs	41.30	58.70	
	other services	37.18	62.82	
UC 25	Trade and trans.	44.15	55.85	See related discussion.
UC 26	Unallocated serv.	43.51	56.49	See related discussion.
UC 27	Scrap & by-products			By-products production for each industry was divided relative to the producing industry.b/
UC 29	Maint. construction	41.22	58.78	Building permit activity (117).
UC 30	New construction	41.22	58.78	"
UC 31	State & local govt.	43.36	56.64	Population data
UC 32	Federal govt.	43.36	56.64	"
UC 33	Inventory addition			Inventory change for each industry was divided relative to total output of the producing industry.b/
UC 34	Inventory depletion			"
UC 35	Gross private capital formation	37.23	62.77	New capital expenditure data (115).
UC 36	Farm households			Noncommercial consumption for each product was divided in proportion to relative regional production.

a/ In general, input structures were divided in proportion to output. Sectors containing exceptions to this rule are marked with an asterisk. See related discussion pp. 103-108 for the particular modifications.

b/ The division was made for industry components of each sector.

products, (2) machinery (except electrical), (3) electrical machinery, and (4) transportation equipment (except electrical). The North produces relatively more transportation equipment and relatively less machinery than does the South. Thus, while technical coefficients of corresponding regional subsectors are considered identical, technical coefficients of corresponding regional sectors vary due to different proportions of included components.

Data availability dictated the level of weighting possible. Although input structures were developed for many small industrial aggregates while constructing Model I (four-digit SIC industries), adequate output data on which to base regional input distributions were available only for larger aggregations (two- and three-digit SIC industries).

Sectors which contain additional adjustments of individual technical coefficients are marked with an asterisk in Table S.48. Discussion of these specific adjustments follows the general discussion of type and source of data used.

Type and Source of Data Used

Value output data by region, corresponding exactly to the output estimate for California as a whole, were available only for the mining sector (UC 22).[1/] For other sectors it was necessary to assume that output was divided between the North and the South in proportion to some related measure published on a regional basis. Measures used, in order of decreasing preference, were as follows: (1) regional value output data, (2) physical output data, (3) value added data, (4) wages paid data, and (5) physical employment data. For some sectors, combinations of two or more measures were used. The specific type and source of data used in the division of each sector's output (and thus also in division of the inputs) are also listed in Table S.48.

1/ For example, the sum of county agricultural data in the Census (107) does not correspond exactly to state data in USDA publications. Also, value of shipment data for industries (115) is not published for regions smaller than a state.

Regional Distribution of Particular Agricultural Inputs

Data limitations made it impractical to examine individual regional input-output coefficients for most sectors of the model. However, because of the emphasis of this study on agricultural and agricultural processing sectors, key coefficients in this portion of the model were given additional attention. Discussions of these particular relationships, classified by purchasing sector, follow.

UC 1, Meat Animals and Products.--The relative amounts of hay and pasture used in northern and southern California differ widely. The South uses more hay and less pasture than the North. Pasture acreages are listed in (107) by county. The amount of hay used in southern California is not available, however. Therefore, it was assumed that the total value of forage inputs per dollar of output was the same for both the North and the South (i.e., because the South uses less pasture than the North, it uses correspondingly more hay). Thus, although components of the forage sector are used in different proportions in the two regions, the aggregate regional technical coefficients are identical in the model.

UC 3, Farm Dairy Products.--Because milk is largely produced under dry lot conditions in southern California, the South raises few dairy calves and imports a large number of mature dairy animals. Thus, while 40.67 percent of California's milk is produced in the South, only 7 percent of all milk fed to calves (UC 3) was allocated to the South (on the basis of relative calf numbers). Conversely, the South received 70.37 percent of California's dairy cattle imports (10, 50, and 107).

UC 13, Dairy Products.--A preliminary input and output distribution between the North and the South using wage data (23, 24) implied small net exports of unprocessed fluid milk from the South to the North and large exports of processed dairy products from the North to the South. In reality, net South to North flows of raw milk do not occur. Therefore, the intermediate flow of milk from South to North was eliminated by increasing the value of milk inputs to processing in the South and decreasing the value of milk inputs to processing in the North (i.e., zero net raw milk exports were assumed for each region). Estimated gross domestic output of UC 13

was increased for the South and decreased for the North so that the adjustment in milk inputs from UC 3 did not affect the value of inputs from the household sector (UC 37).[1/]

The above adjustments are consistent in view of the higher prices paid in the South for both unprocessed and processed milk (10). Nonmilk inputs, unaffected by the milk price differential, were divided in proportion to the North-South wage distribution. Resulting output and input distribution percentages were as follows: (1) output--North 59.05 percent, South 40.95 percent; (2) raw milk inputs (UC 3)--North 59.53 percent, South 41.47 percent; and (3) other inputs--North 59.53 percent, South 40.47 percent.

UC 14, Canning, Preserving, Freezing.--Total output and nonagricultural inputs were divided relative to total wages paid by the industry (see Table S.48). However, most agricultural inputs are processed in the same area where they are produced. Southern sector UC 14 is composed largely of fish and citrus processing plants. Northern sector UC 14 has a larger percentage of fruit and vegetable processing establishments than does the South. Therefore, the division of agricultural inputs was made as follows:

1. Fruit inputs (UC 7) and miscellaneous agricultural inputs (UC 10) were allocated in proportion to relative farm production. Data sources were (9) for fruits, (107) for miscellaneous agricultural products excluding fish, and (23, 24) for fish.

2. All citrus processed (juice, concentrates, etc.) (UC 8) was allocated to the South.

3. Vegetables (UC 6), in contrast to other agricultural inputs, were divided in proportion to the relative regional output of the canning, preserving, and freezing sector rather than in proportion to regional farm production. A large proportion of the vegetable production in the South is for the fresh market. To distribute vegetable inputs relative

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1/ Household inputs are treated as the residual between total outlay and nonhousehold inputs. If one input is altered, keeping other inputs constant, the household input is also altered.

to regional production would overstate southern and understate northern vegetable inputs.

Although the type of agricultural input varies between the two regions, the aggregate value of agricultural inputs per dollar of output are comparable.

UC 15, Miscellaneous Agricultural Processing.--All agricultural inputs (sectors UC 6, 7, and 10) were allocated between regions relative to the value of regional production (107). Vegetables (UC 6) were allocated in this manner rather than as described for UC 14 because of the particular processing type crops involved.

Regional Distribution of Sectors Requiring Alternative Methodology

UC 25, Trade and Transportation.--Independent data sources on which to base the regional distribution of trade and transportation margins are not available. Therefore, distribution of total output for UC 25 was assumed proportional to the sum of the individual input distributions derived in estimating the input structure of other sectors.

Eighty-nine percent of total California trade and transportation margins was distributed to regional sectors excluding sectors UC 25, 26, and 28. Distribution to these sectors could not be estimated before the output percentages for UC 25 were derived. The balance of trade and transportation output (11 percent) was assumed to be distributed between the North and the South in the same proportion as the 89 percent of output already distributed. These percentages, 44.15 for the North and 55.85 for the South, differ by only 0.73 percent from the division of total retail sales as quoted in (20).

UC 26, Unallocated Services.--Data are not available to independently distribute the output of this sector between the North and the South. With the division of all other sectors specified, however, UC 26 was divided between the two regions so as to keep its input and output structure consistent with each other.

The distribution of output of UC 26 was specified for all sectors except UC 26 itself (including exports to UC 28). The percent of UC 26

output that was produced in the South was then derived with the following equation:

$$10,213,025\ X - 674,346 = 5,388,556\ X$$

The figure 10,213,025 is the gross domestic output of UC 26 for both regions of California. X is the percent of output that is produced in the South. The number 5,388,556 is the sum of all output distributed from South UC 26 except to South UC 26 itself. The figure 674,346 is the distribution from UC 26 to UC 26 for California as a whole. Solving for X, it is seen that 56.49 percent of the output of this sector originated in the South. Therefore, 43.51 percent of California output originated in the North.

UC 28, Net Exports and Imports.--The difference between estimated regional production and estimated regional consumption was designated as net imports or net exports for each sector. Table S.49 lists the net exports of northern and southern California by sector of origin. These imports were reallocated to purchasing sectors as in Model I--that is, the available supply of imports from each region was allocated among the purchasing sectors in proportion to the total use of that commodity by the purchasing sector relative to the total use of that commodity by all sectors. Thus, imports per unit of output in the final model (as presented in Table III-II) are considered fixed (noncompetitive).

Four alternative import-export relationships occurred in the construction Of Model III.

1. Both the North and the South were net exporters. No flows are shown between the two regions. All exports are distributed to sector UC 28 (net exports to outside of California).

2. Both the North and the South were net importers. No flows are shown between the two regions. Each region's deficit is distributed to the purchasing sector from sector (row) UC 28 (net imports from outside of California).

3. The North was a net exporter and the South was a net importer. Exports are distributed from the northern producing sector to the southern purchasing sector until either the South's import requirements are filled or the North's export capacity is reached. All northern exports not used

TABLE S-49

California Regional Net Imports and Exports by Sector of Origin

Producing sector	Northern Calif.		Southern Calif.	
	Net exports	Net imports	Net exports	Net imports
UC 1 Meat animals		39,884		207,950
UC 2 Poultry & eggs	26,626			24,989
UC 3 Farm dairy products	--	--	--	--
UC 4 Food & feed grains	45,327			70,711
UC 5 Cotton	202,052		25,845	
UC 6 Vegetables	130,816		10,491	
UC 7 Fruit & nuts	59,130			9,364
UC 8 Citrus	19,449		89,154	
UC 9 Forage	30,510			33,468
UC 10 Misc. agriculture	24,841		21,773	
UC 11 Grain mill products		8,337		35,316
UC 12 Meat & poultry proc.		92,655		98,285
UC 13 Dairy products	29,362			124,712
UC 14 Canning, etc.	716,315		110,421	
UC 15 Misc. agri. proc.	1,024			179,559
UC 16 Chem. & fertilizers		212,299		291,055
UC 17 Petroleum	226,342		375,114	
UC 18 Fab. metals & mach.		724,610		854,952
UC 19 Aircraft	129,215		3,973,863	
UC 20 Primary metals		172,261		728,958
UC 21 Other manufacturing		972,869		1,323,617
UC 22 Mining	97,168		58,441	
UC 23 Utilities	39,273			137,452
UC 24 Selected services	168,339		383,686	
UC 25 Trade & trans.	119,067		145,210	
UC 26 Unallocated services		4,526	124,526	
UC 27 Scrap & by-products	11,746			22,140

by the South are exported to outside California. If the North could not supply all the imports needed by the South, the deficit was supplied from outside of California

4. The South was a net exporter and the North a net importer. This situation occured only for sector UC 26 (unallocated services). The net export of this sector was motion picture production.[1/] The entire amount is allocated to northern sector UC 24 (selected services) which includes motion picture distribution.

UC 37, Other Households.--Total regional output was defined as the sum of individual sector's inputs from households. Individual sector's inputs from households were derived as the difference between each sector's total output and the sum of its nonhousehold inputs.

Inputs to California households were divided as shown in Table S.50. Various measures were used to divide the different classes of consumption goods in an effort to show variations between the regions' household consumption pattern. For instance, while the South made 55.12 percent of all California retail food purchases, it made only 48.08 percent of California purchases at service stations.

Summary of Final Demand for Products of Northern and Southern California

Final demand for products of northern and southern California in 1954 is summarized in Tables S.51 and S.52, respectively. Flows are classified by sector of origin and sector of consumption for each California region and by sector of origin only for exports out of the state. Flows to intermediate sectors are not presented but may be reconstructed by multiplying technical coefficients of Table II-III times the corresponding gross domestic output totals.

1/ Exports of motion picture production were estimated independently instead of being derived as the difference between consumption and production as were exports of other sectors. Northern California population, compared to United States population and the estimate of California motion picture exports to outside of the state, was used as a rough estimate of demand.

TABLE S.50

Division of Inputs into the Other Household Sector (UC 37), by Regions and Primary Data Source, Model III.

Input	Type of data	North %	South %
Food	Retail food sales	44.88	55.12
Petroleum	Service station sales	51.92	48.08
Fab. metals & machinery	Retail sales of autos, household furniture, and appliances	41.00	59.00
Aircraft	Personal income	43.73	56.27
Governments	" "	43.73	56.27
Households	" "	43.73	56.27
Other manufacturing	Retail sales of apparel, household furnishings	42.32	57.68
Utilities	Population	44.61	55.39
Unallocated services	"	44.61	55.39
Construction	"	44.61	55.39
Selected services	"	44.61	55.39
Chemicals & fertilizers	Total retail sales	44.88	55.12
Primary metals	" " "	44.88	55.12
Mining	" " "	44.88	55.12
Trade & transportation	" " "	44.88	55.12
Noncompetitive imports	" " "	44.88	55.12

Source of data: (20).

TABLE S.51

Final Demand for Products of Northern California, 1954, Model III. (thousands of dollars)

Producing sector	North purchases from north										Net exports from north to south					Other net exports	Total final demand	Gross domestic output
	N-27	N-29	N-30	N-31	N-32	N-33	N-34	N-35	N-36	N-37	S-29	S-30	S-31	S-32	S-37	N-28		
N.1	93					11,457			2,150								13,700	227,686
N.2				201		8			7,592	79,909			40		15,160	1,637	104,547	176,621
N.3	26,938					1,214			5,919								34,071	203,814
N.4						23,123											23,123	182,603
N.5	31,429					16,501										202,052	249,982	251,290
N.6	1,391			236			- 6,134		7,717	79,456						130,816	213,482	338,755
N.7				236		635			1,258	15,608			78		4,895	49,766	72,476	313,795
N.8				11					163	6,479						19,449	26,102	26,102
N.9							- 1,574										- 1,574	147,755
N.10	30					2,737				14,299						22,841	39,907	159,966
N.11	701			92		237				57,099							58,129	220,823
N.12	14,963			1,624			- 1,013			361,105							376,679	463,016
N.13				1,010			- 629			233,047			103		22,403		255,934	336,935
N.14	233			468		14,066				131,813						716,315	862,895	905,014
N.15	3,204		133	935		4,336				522,573			1		657		531,839	945,797
N.16	23,777	20,993	9,269	1,935		443				69,042							125,399	399,843
N.17	634	20,677	26,092	4,397			- 292	9		287,964						226,342	565,823	1,351,791
N.18	5,909	61,461	190,832	11,580			- 3,751	194,938		298,118							759,087	1,306,849
N.19	360			8			- 75	4,176		625						129,215	134,309	151,957
N.20	6,486	16,870	69,000	25		249				693							93,323	349,463
N.21	3,518	45,413	212,459	11,261			- 349	23,144		689,415							984,861	1,847,262
N.22		6,726	23,052	22						3,420						97,168	130,388	158,871
N.23		969	5,406	18,179	21,179					101,974	57	316	925	1,077	5,185		155,267	767,870
N.24		12,116	45,587	6,798	4,841					1,189,562							1,258,904	1,704,029
N.25		103,445	259,354	7,154	135,286			86,959		2,043,171						168,339	2,803,708	3,599,387
N.26		7,878	78,364	398,289	176,077			44,492		2,801,798						119,067	3,625,965	4,443,520
N.27		154	2,344			137					20	300					2,955	119,666
28		78,793	258,233	14,264				134,180		696,183							1,181,653	272,021
29		111		161,610	48,995					9,495							220,211	732,562
30				317,259	133,830			1,414,368									1,865,457	1,865,457
31		2,232	11,080	59,783	160,763			633		667,671							902,162	1,755,434
32		7,099	28,450		7,328			12,997		1,428,238							1,484,112	2,348,874
37		298,604	763,102	698,694	1,627,813			46,322		141,077							3,575,618	13,542,417
Total	119,666	683,481	1,982,757	1,716,071	2,316,118	75,143	-13,817	1,962,218	24,799	11,929,834	77	616	1,147	1,077	48,300	1,883,007	22,730,494	41,617,245

TABLE S.52

Final Demand for Products of Southern California, 1954, Model III. (thousands of dollars)

Producing sector	South purchases from south										Other net exports[a]	Total final demand	Gross domestic output
	S-27	S-29	S-30	S-31	S-32	S-33	S-34	S-35	S-36	S-37	S-28		
S.1	54					7,075			1,222			8,351	109,195
S.2				209		5			5,828	78,721		84,763	135,596
S.3	18,419					830			4,077			23,326	139,729
S.4						3,246						3,246	15,126
S.5	4,132					2,169					25,845	32,146	33,039
S.6	333			293			- 1,438		3,396	93,349	10,491	106,424	149,084
S.7				214		23			104	13,445		13,786	25,847
S.8				14					694	7,611	89,154	97,473	110,915
S.9							- 446					- 446	33,448
S.10	10					1,323				16,799	21,773	39,905	134,812
S.11	356			101		196				58,328		58,981	182,875
S.12	18,200			2,062			- 1,233			433,733		452,762	563,173
S.13				818			- 428			178,640		179,030	233,694
S.14	81			580		4,917				154,861	110,421	270,860	316,327
S.15	1,383		154	944		1,356				498,897		502,734	781,346
S.16	27,678	28,383	12,569	2,285		516				80,627		152,058	465,431
S.17	597	29,485	37,207	5,460			- 276	16		266,666	375,114	714,269	1,508,896
S.18	11,996	103,409	321,077	16,964			- 7,594	387,785		506,165		1,339,802	2,690,665
S.19	10,412			9			- 2,167	7,041		805	3,973,863	3,989,963	4,397,650
S.20	10,143	15,315	62,637	19		389				542		89,045	546,365
S.21	5,200	66,863	312,810	14,436			- 2,670	40,289		970,162		1,407,090	2,762,987
S.22		9,592	32,872	28						4,200	58,441	105,133	147,238
S.23		1,185	6,605	19,335	22,526					108,466		158,117	821,351
S.24		17,278	65,008	8,441	6,010					1,899,408	383,686	2,379,831	2,730,083
S.25		147,513	369,841	8,883	167,978			146,614		2,509,349	145,210	3,495,388	4,553,243
S.26		11,234	111,748	494,536	218,627			75,015		3,478,852	120,000	4,510,012	5,769,505
S.27		183	2,778			235						3,196	108,994
28		104,859	346,946	17,631	2,693			165,842		1,031,042		1,669,013	307,494
29		159		200,662	60,835					11,790		273,446	925,572
30				393,925	166,170			2,384,632				2,944,727	2,944,727
31		3,183	15,800	74,230	199,611			1,066		859,132		1,153,022	2,208,017
32		10,124	40,570		9,098			21,912		1,837,798		1,919,502	3,130,384
37		425,811	1,088,189	867,533	2,021,181			78,100		181,533		4,662,347	19,127,329
Total	108,994	974,576	2,826,811	2,129,612	2,874,729	22,280	-16,252	3,308,312	15,321	15,280,921	5,313,998	32,839,302	58,110,137

a/ No net exports from South to North occurred for products going to final demand.

LITERATURE CITED

1. Brodell, Albert P., Paul E. Strickler and Harold C. Phillips, Extent and Cost of Spraying and Dusting on Farms, 1952 (Washington: April, 1955) (U. S. Dept. of Agr. Stat. Bul. 156).

2. Brubaker, Sterling, The Impact of Federal Government Activities on California Economic Growth, 1930-1956, unpublished Ph.D. thesis (Berkeley: University of California, 1959).

3. Burrill, Floyd I., Information on Arizona Citrus Processed in California and Government Purchases of California Citrus (Private communication) (Sunkist Growers, March, 1960).

4. California County Agricultural Commissioner's Reports for 1954, (Published in various forms at various dates from each county).

5. California Department of Agriculture, Bureau of Agricultural Statistics, Crop and Livestock Reporting Service, California Annual Livestock Report, Summary for 1954 (Sacramento: May, 1955).

6. _____, _____, _____, California Bushberries (Sacramento: March, 1955) (Mimeo).

7. _____, _____, _____, California Carlot Shipments, Fruits and Vegetables, 1954 (Sacramento: May, 1955).

8. _____, _____, _____, California Field Crop Statistics, 1944-1957 (Sacramento: June, 1958).

9. _____, _____, _____, California Fruit and Nut Crops, 1909-1955, Acreage, Production, Utilization, and Value (Sacramento: July, 1956) Special Publication 261).

10. _____, _____, _____, Manufactured Dairy Products, Milk Production, Utilization, and Prices for 1954 (Special Publication No. 256).

11. _____, _____, _____, Poultry and Hatchery Production in California, Summary for 1954 (Sacramento: May, 1955).

12. _____, _____, _____, Vegetable Crops in California, 1949-1956 (Sacramento: August, 1957).

13. _____, _____, _____, Wool and Mohair Production, 1954-1955 (Sacramento: March, 1956) (Mimeo.).

14. _____, Bureau of Market News, Interstate Shipments of California Deciduous Tree Fruits, 1954 Season (San Francisco: June, 1955).

15. _____, _____, Monthly Average Prices of Livestock at Stockton, 1950 to Date (Stockton: January, 1959) (Mimeo).

16. _____, _____, Unloads of Fresh Fruits and Vegetables at Los Angeles, 1954 (February, 1955).

17. _____, _____, Unloads of Fresh Fruits and Vegetables at Oakland, 1954 (February, 1955).

18. _____, _____, Unloads of Fresh Fruits and Vegetables at San Francisco, 1954 (February, 1955).

19. _____, _____, Westbound Egg Passings by Truck at California Border Stations, 1954 (San Francisco: January, 1955) (Mimeo).

20. California State Chamber of Commerce, Research Department, Economic Survey Series, various individual subject titles and years.

21. California State Controller, Annual Report of Financial Transactions Concerning Cities of California: 1953-54, 1954-55, 1956-57. (Sacramento).

22. _____, Annual Report of Financial Transactions Concerning Counties of California: 1953-54, 1954-55, 1956-57 (Sacramento).

23. California State Department of Employment, Bureau of Research and Statistics, California Employment and Payrolls (Sacramento Quarterly Report 127, numbers 17a, b, c, and d.) (Mimeo).

24. _____, _____, unpublished county employment and payroll data.

25. _____, Farm Placement Service, California Annual Farm Labor Report, 1954 (Sacramento: February, 1955) (Mimeo).

26. California Statistical Abstract, Senate of the State of California, Sacramento: October, 1958.

27. Cameron, B., "The Production Function Leontief Models," Review of Economic Studies, Vol. XX, No. 1, pp. 62-69.

28. Carter, Harold O., Regional Input-Output Analysis of Agriculture and Industry (Unpublished Ph.D. thesis, Iowa State University Library, Ames, 1958).

29. _____ and Earl O. Heady, An Input-Output Analysis Emphasizing Regional and Commodity Sectors of Agriculture (Iowa Agr. Expt. Sta. Res. Bul. 469).

30. Chenery, Hollis B. and Paul G. Clark, Interindustry Analysis (John Wiley and Sons, Inc., New York: 1959).

31. _____, _____, and Vera Cao Pinna, Mutual Security Agency, Special Mission to Italy for Economic Co-operation, Rome, Italy, The Structure and Growth of the Italian Economy (Rome, Italy: Mutual Security Agency, 1953).

32. Dean, Gerald W. and Chester O. McCorkle, Jr., Projections Relating to California Agriculture in 1975 (Giannini Foundation of Agricultural Economics Mimeo. Report 234, 1960).

33. Dorfman, Robert, Paul A. Samuelson, and Robert M. Solow, Linear Programming and Economic Analysis (McGraw-Hill Book Co. New York: 1958).

34. Evans, W. Duane and Marvin Hoffenberg, The Interindustry Relations Study for 1947, Division of Interindustry Economics, Bureau of Labor Statistics, U. S. Department of Labor, December 26, 1950.

35. Farrell, Kenneth R., Situation, Trends, and Government Programs for Feed Grains and Wheat (Univ. of Calif. Extension Service, October, 1958) (Mimeo).

36. Federal Power Commission, Statistics of Electrical Utilities in the United States, Privately Owned, 1954 (Washington) (FPC S-120).

37. _____, Statistics of Electrical Utilities in the United States, Publicly Owned, 1954 (Washington) (FPC S-121).

38. Grapefruit Administrative Committee and Grapefruit Advisory Board, Desert Grapefruit Marketing Program. Thirteenth and Fourteenth Annual Reports (Phoenix) (Mimeo).

39. Hatanaka, M., Testing the Workability of Input-Output Analyses (Princeton: 1957) (Mimeo).

40. Hirsch, Werner Z., "Interindustry Relations of a Metropolitan Area," The Review of Economics and Statistics, Vol. XLI, Nov., 1959.

41. Hoch, Irving, Chicago Area Transportation Study: Forecasting Economic Activity for the Chicago Region, (Chicago: May, 1959).

42. Isard, Walter, "Interregional and Regional Input-Output Analysis: A Model of a Space Economy," The Review of Economics and Statistics, 33:318-328, 1951.

43. Jennings, R. D., Feed Consumed by Livestock, 1949-50, by States (Washington: June, 1954) (U. S. Dept. of Agr. Agr. Stat. Bul. 145).

44. _____, Relative Use of Feeds for Livestock, Including Pasture, by States (Washington: February, 1955) (U. S. Dept. of Agr. Stat. Bul. 153).

45. Kern County Potato Growers Association, Convention Yearbook, 1955 (Bakersfield, March, 1955) Vol. XI.

46. Knowles, Paul F. and Milton D. Miller, Safflower in California (University of California, Davis, April, 1958) (Mimeo).

47. Leontief, Wassily, The Structure of the American Economy, 1919-1939 (2nd ed., Oxford University Press, New York: 1951).

48. _____, and Members of the Harvard Economics Research Project, Studies in the Structure of the American Economy (New York: Oxford University Press, 1959).

49. "Life Study of Consumer Expenditures," (N. Y. Time, Inc., 1957) Vol. 1

50. Los Angeles County Livestock Department, Annual Report of Interstate Dairy Cattle Shipments Received in Los Angeles County, Under Permit, During the Calendar Year 1954 (Los Angeles: February, 1955) (Mimeo).

50.a Martin, William E., A California Interindustry Analysis Emphasizing Agriculture, (Ph.D. Dissertation, University of California, Berkeley, 1961), pp. 1-206.

51. Masucci, Robert H., Dollar Volume of Agriculture's Transactions with Industry, U. S. Agricultural Marketing Service, Marketing Research Report 375 (Washington: Gvt. Print. Off., December, 1959).

52. McCorkle, C. O., A Statistical Picture of California's Agriculture (California Agr. Exp. Sta. Circ. 459, April, 1957).

53. McGlothlin, Robert L., Hay and Feed Grains in the West (Arizona Agr. Exp. Sta. Bul 289, Tucson, November, 1957).

54. Miklius, W. and D. B. DeLoach, Cut Flower Production and Consumption Trends in California (California Agr. Exp. Sta., Giannini Foundation of Agricultural Economics, August, 1959) (Mimeo).

55. Moore, Frederick T. and James W. Peterson, "An Interindustry Model of Utah," Review of Economics and Statistics, Vol. XXXVIII, November, 1955.

56. _____ and _____, A 56 Sector Interindustry Table of California for 1947, unpublished.

57. Mortenson, W. P. and G. E. Annin, An Economic Study of the Turkey Industry (Dept. of Agr. Econ., Univ. of Wisconsin, June, 1954).

58. Moses, Leon N., "The Stability of Interregional Trading Patterns Input-Out Analysis," American Economics Review, Vol. 45, December, 1955.

59. Muskin, Selma, "Distribution of Federal Taxes Among the States," National Tax Journal, June, 1956.

60. Peterson, G. A. and Earl O. Heady, Applications of Input-Output Analysis to a Simple Model Emphasizing Agriculture (Iowa Agr. Exp. Sta. Bul. 427, 1955).

61. Phillips, A., "The Tableau Economique as a Simple Leontief Model," Quarterly Journal of Economics, Vol. 69, February, 1955.

62. Schnittker, John Alvin and Earl O. Heady, Application of Input-Output Analysis to a Regional Model Emphasizing Agriculture (Iowa Agr. Exp. Sta. Res. Bul. 454, 1958).

63. Seaver, S. K., Summary of "Economic Analysis of Market Organization and Operation of the California Egg Industry" (Giannini Foundation of Agricultural Economics, August, 1959) (Preliminary mimeo).

64. Shear S. W. and R. E. Blair, California Fruit Statistics and Related Data (Calif. Agr. Exp. Sta. Bul. 763, June, 1958).

65. Shultis, Arthur and Warren Bailey, Estimated Labor Requirements for California Agriculture, 1950-1955 (Univ. of Calif. Agr. Ext. Serv., Berkeley, 1956).

66. Strickler, Paul E. and Harold C. Phillips, Harvesting Hay and Straw (Washington May, 1956) (U. S. Agr. Res. Serv.) (ARS 43-27).

67. Sunkist Growers, Marketing Research Department, Statistical Information on the Citrus Fruit Industry, July, 1956.

68. University of California, Agricultural Extension Service, Sunflowers as a Field Crop (Davis: February, 1955) (Mimeo).

69. University of Maryland, Bureau of Business and Economic Research, A Regional Interindustry Study of Maryland, Vol. 8, No. 2 of a series on "Studies in Business and Economics" under the direction of John H. Cumberland, September, 1954.

70. U. S. Department of Agriculture, Agricultural Statistics, 1955, 1956, 1957 (Washington: Gvt. Print. Off., 1956, 1957, 1958).

71. _____, Agricultural Marketing Service, Acreage and Production of Vegetable Seeds in 1954 and 1955 (Washington: April 15, 1955) (Mimeo).

72. _____, _____, Agricultural Prices (Monthly Series for 1954).

73. _____, _____, Consumption of Food in the United States, 1909-1952, Supplement for 1956 (Washington: September, 1957) (U. S. Dept. of Agr., Agr. Handbook 62).

74. _____, _____, Dairy and Poultry Market Statistics, 1954 (Washington: August, 1955) (U. S. Dept. Agr. Stat. Bul. 165).

75. _____, _____, Farm Phone Bills (Washington: November, 1954) (Mimeo).

76. _____, _____, Kilowatt Hours Used, Average Cost per Kilowatt Hour, and Average Monthly Bill by Regions (Washington: February, 1955) (Processed).

77. _____, _____, Livestock and Meat Statistics, 1957 (Washington: July, 1958) (U. S. Dept. of Agr. Stat. Bul. 230).

78. _____, _____, State Estimates of Farm Income, 1949-59, A Supplement to the July, 1960 issue of the Farm Income Situation. FIS-179 (Supplement).

79. _____, _____, Statistics on Cotton and Related Data 1920-1956 (Washington: Gvt. Print. Off.),

80. _____, _____, The Farm Income Situation (July, 1957) (FIS-164).

81. _____, _____, The Feed Situation (September, 1959) (FDS-177).

82. _____, _____, Crop Reporting Board, Cattle and Calves on Feed, by States (Washington: October, 1956) (AMS-147).

83. _____, _____, _____, Chickens and Eggs: Farm Production, Disposition, Cash Receipts and Gross Income by States. Revised Estimates 1950-1954 (Washington: June, 1956) (U. S. Department Agr. Stat. Bul. 183).

84. _____, _____, _____, Citrus Fruits, Production, Use and Value by States 1949-50 to 1955-56 (Washington: January, 1957) (U. S. Dept. Agr. Stat. Bul. 201).

85. _____, _____, _____, Citrus Prices: Monthly and Season Average Prices Received by Growers by Utilization Groups, 1953-54 and 1954-55 (Agricultural prices, Supplement No. 2, October, 1955 and October, 1956) (Mimeo).

86. _____, _____, _____, Commercial Livestock Slaughter: Number and Live Weight by States, 1944-57 (Washington: July, 1958) (U. S. Dept. of Agr. Stat. Bul. 231).

87. _____, _____, _____, Cotton Production (Washington: May, 1956).

88. _____, _____, _____, Field and Seed Crops: Disposition, Price, Value of Production, Value of Sales, by States, 1949-1954 (Washington: May, 1957) (U. S. Dept. of Agr. Stat. Bul. 208).

89. _____, _____, _____, Livestock and Poultry on Farms and Ranches, January 1, by States (Washington: February 1954 and 1955) (Mimeo).

90. _____, _____, _____, Meat Animals: Farm Production, Disposition, and Income, by States, 1954-55 (Washington: April, 1956) (AMS-35).

91. _____, _____, _____, Milk, Farm Production, Disposition and Income, 1954-55 (AMS-30) (April, 1956).

92. _____, _____, _____, Nursery Products: Production and Sales, 1956, in Selected States [sp. cr. 6-2 (8-57) August, 1957].

93. _____, _____, _____, Potatoes and Sweet Potatoes: Production, Value, and Distribution by States 1949-1955 (Washington: August, 1956) (U. S. Dept. of Agr. Stat. Bul. 190).

94. _____, _____, _____, Turkeys: Farm Production, Disposition, Cash Receipts, and Gross Income by States. Revised Estimates 1950-1954 (Washington: June, 1956) (U.S. Dept. Agr. Stat. Bul. 182).

95. _____, _____, _____, Vegetables for Fresh Market, by States, 1949-55 (Washington: June, 1957) (U.S. Dept. of Agr. Stat. Bul. 212).

96. _____, _____, _____, Vegetables for Processing, by States, 1949-55 (Washington: May, 1957) (U. S. Dept. of Agr. Stat. Bul. 210).

97. _____, _____, _____, Farm Income Branch, Agricultural Industrial Relations Study, 1955, Explanatory Notes to Input Tables. Working Materials (Washington: January, 1959) (Mimeo).

98. _____, _____, _____, Agricultural Industrial Relations Study, 1955, I-O 18, Agricultural Services. Working Materials (Washington: January, 1959) (Mimeo).

99. _____, _____, _____, Production Expenses of Farm Operators by States, 1949-57 (Washington: October, 1958) (AMS-85).

100. _____, _____, Market News Branch, Carlot Unloads of Certain Fruits and Vegetables in 100 U.S. and 5 Canadian Cities; also Truck Unloads in 20 U.S. Cities, Calendar Year 1954 (Washington: April, 1955) (AMS-25).

101. _____, Agricultural Research Service, Fertilizer Used on Crops and Pasture in the United States, 1954 Estimates (Washington: August, 1957) (Stat. Bul. 216).

102. _____, _____, Major Uses of Land in the United States, Summary for 1954 (Washington: January, 1957) (Agr. Information Bul. 168).

103. _____, _____, The Use of Horses and Mules on Farms (Washington: March, 1959) (ARS 43-94).

104. _____, Bureau of Agricultural Economics, Harvesting Hay and Straw and the Use of Balers (Washington: January, 1953).

105. _____, Farmer Cooperative Service, Estimated Cash Expenditures for Production Supplies and Equipment by Farm Operators, United States, 1954 (Processed).

106. _____, Foreign Agricultural Service, Foreign Agricultural Trade of the United States, Statistical Report for Calendar Year 1954 (Washington: June, 1955).

107. U. S. Department of Commerce, Bureau of the Census, 1954 Census of Agriculture (Washington, 1956) Vol. 1, part 33, and Vol. II.

108. _____, _____, Census of Agriculture: 1954, Farmer's Expenditures (Washington: Gvt. Print. Off., 1956) Vol. III, part 11.

109. _____, _____, Census of Business 1948, 1954 (Washington: Gvt. Print. Off., 1950, 1955).

110. _____, _____, Compendium of State Government Finances, 1954, 1955, 1957 (Washington: Govt. Print. Off., 1955, 1956, 1958).

111. _____, _____, Cotton Production and Distribution (Washington: Gvt. Print. Off., 1956) (Bureau of Census Bul. 192).

112. _____, _____, Cotton Production in the United States, Crop of 1956 (Washington: Govt. Print. Off., 1957).

113. _____, _____, Facts for Industry: Animal and Vegetable Fats and Oils 1954 (Washington: Gvt. Print. Off., 1955).

114. _____, _____, Statistical Abstract of the United States, 1949, 1956 (Washington: Gvt. Print. Off., 1949, 1956).

115. _____, _____, United States Census of Manufacturers, 1947, 1954 (Washington: Gvt. Print. Off., 1949, 1956).

116. _____, _____, United States Census of Governments, 1957 (Washington: Gvt. Print. Off., 1959) Vol. VI, No. 4, Vol. IV, No. 1.

117. _____, and U. S. Department of Labor, Construction Review, (Washington: February, 1955) Vol. I, No. 2.

118. _____ and _____, Construction Volume and Costs: A Statistical Supplement to the Construction Review, 1958.

119. _____, National Production Authority, Facilities and Construction Bureau, Building Materials Division, Construction and Building Materials Statistical Supplements, May, 1952, June, 1952, and May 1953.

120. _____, Office of Business Economics, Survey of Current Business: National Income Number, July, 1957.

121. _____, _____, U. S. Income and Output, A Supplement to the Survey of Current Business (Washington: Gvt. Print, Off., 1958).

122. U. S. Department of the Interior, Bureau of Mines, Minerals Yearbook 1947, 1954 (Washington: Gvt. Print. Off., 1948, 1955).

123. U. S. Department of Labor, Bureau of Labor Statistics, Division of Interindustry Economics, Agriculture in the 1947 Interindustry Study (Working Papers, October, 1952) (Mimeo).

124. _____, _____, _____, Conference on Research in Income and Wealth: The Government Sector of the 1947 Interindustry Study, October, 1952. (Mimeo).

125. _____, _____, _____. Industry Classification Manual for the 1947 Interindustry Relations Study (Washington: 1953) (Mimeo).

126. _____, _____, _____, New and Maintenance Construction: Construction in the 1947 Interindustry Relations Study (Washington: February, 1953) (B.L.S. Report No. 2) (Mimeo).

127. _____, _____, _____, The 1947 Interindustry Relations Study: General Explanations of the 200 Sector Tables (Washington: June, 1953) (B.L.S. Report No. 33).

128. _____, _____, _____, The 1947 Interindustry Relations Study, Tables I, II, and III (Washington: 1952).

129. U. S. Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Carload Waybill Statistics for 1954: State-to-State Distribution of Products of Agriculture Traffic and Revenue (Washington: November, 1955).

130. _____, _____, Carload Waybill Statistics for 1954: State-to-State Distributions of Manufactures and Miscellaneous Traffic and Revenue (Washington: 1955).

131. U. S. Tariff Commission, Edible Tree Nuts; Report to the President under Section 22 of the Agricultural Adjustment Act, as amended (Washington: September, 1954) (Mimeo).

132. U. S. Treasury Department, Commissioner of Internal Revenue, Annual Report, 1953-54, 1954-55.

133. Quesnay, Francois, Tableau Economique, first printed in 1758, reproduced in facsimile for the British Economic Association (London, England: 1894).

134. Walras, Leon, Elements of Pure Economics, translated by W. Jaffe, (Homewood, Ill, Richard Irwin, Inc., 1954).

135. Western Canner and Packer, Statistical Review and Yearbook Number (May 25, 1955) Vol. 47, No. 6.

136. Zusman, P., Information on California Labor Coefficients (Private communication).